# PREHISTORIC SETTLEMENT IN THE WESTERN DELTA: A REGIONAL AND LOCAL VIEW FROM SAIS (SA EL-HAGAR)

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This paper publishes Prehistoric archaeological material from the EES work at Sais. Excavation 3 was carried out in 2001 in the 'Great Pit' and produced pottery, lithics, and faunal and floral material from three main phases: the Early Neolithic (*c.* 4,500–4,200 BC), Middle to Late Neolithic (*c.* 4,000–3,800 BC) and the Buto-Maadi Period (*c.* 3,500 BC). The pottery and object catalogue discusses the typology and wares of the pottery from each phase as well as individual objects, diagnostic lithics and bones, and compares them with datasets from other Lower Egyptian sites including Merimde and Buto. Sais is put into its wider regional context by combining geomorphological data from the drill core programme of the EES Survey and Vertical Electrical Sounding data from the University of Mansoura work in order to reconstruct the ancient environment at Sais. The palaeoenvironmental work shows that Sais was situated upon a river levee on the inside of a significant river channel, with marshes and other sand hills further west. The site seems to have been a fishing camp in the Early Neolithic which was settled in the Middle to Later Neolithic Period for the cultivation of the floodplain. There is a gap in the settlement record of at least 300 years in the early fourth millennium until the Buto-Maadi culture settlement was established at Sais around 3,500 BC. The possible reasons for and implications of the hiatus in continuous settlement at Sais are explored in the context of the development of Lower Egyptian centres of power.

## Introduction

THERE has been little intensive archaeological excavation work in the Delta until the last 35 years partly because of the apparent paucity of remains and partly because of the difficulties of working in the muddy floodplain environment, where the water table is very near ground level. Consequently, much excavation has concentrated on *tell* sites or areas in which archaeological remains are close to or at the surface. Such remains tend to be from the dynastic period and later, although there are Early Dynastic sites upon the sand and gravel hills of the eastern side of the Delta which have also been accessible without the necessity for too much dewatering.[1] As a result, the early settlement history of the Nile Delta and the development from a hunter-gatherer society in the Neolithic Period to a more sedentary agricultural lifestyle in settled communities there has, as yet, too little contiguous linking evidence to provide a coherent narrative.[2] Theories about the introduction of the domestication of animals and crops from the Near East or of African and Western Desert influences on cattle rearing and stone technology are still difficult to test without the necessary background information and evidence from excavations.[3] In addition, the background of Delta geomorphology and the part which the river and inundation played in

[1] B. van Wesemael, 'The Relation Between Natural Landscape and Distribution of Archaeological Remains in the Northeastern Nile Delta', in E. C. M. van den Brink (ed.), *The Archaeology of the Nile Delta: Problems and Priorities* (Amsterdam, 1988), 125–39.

[2] For summaries see, for example, R. Wenke, 'Egypt: Origins of Complex Societies', *Annual Review of Anthropology* 18 (1989), 132–43; K. Bard, 'The Egyptian Predynastic: A Review of the Evidence', *Journal of Field Archaeology* 21 (Autumn, 1993), 265–7; and I. M. Shaw (ed.), *The Oxford History of Ancient Egypt* (Oxford, 2000) with summary articles by S. Hendrickx and P. Vermeersch, 'Prehistory from the Palaeolithic to the Badarian Culture', 17–43 and B. Midant-Reynes, 'The Naqada Period', 57–60.

[3] Summary by B. Midant-Reynes, *The Prehistory of Egypt* (Oxford, 2000), 84–9; W. Wetterstrom, 'Foraging and Farming in Egypt: the Transition from Hunting and Gathering to Horticulture in the Nile Valley', in T. Shaw et al. (eds), *The Archaeology of Africa: Food, Metals and Towns* (London, 1993), 165–236 and recent research into Levantine connections with the Neolithic Fayum in N. Shirai, 'Walking with Herdsman: In Search of the Material Evidence for the Diffusion of Agriculture from the Levant to Egypt', *Neo-Lithics* 1/05 (2005), 12–17.

dictating human settlement patterns can still only be suggested at a relatively broad level.[4] The underlying discussions concerning the Late Neolithic to Chalcolithic Lower Egyptian culture (Buto-Maadi phase) transition, from around 4,400 to 3,500 BC, are based upon a series of assumptions about the location and nature of early settlement in the Delta and localised attempts at detailed analysis of geological data, often set into a geological rather than a human context.[5] This paper is a study of the area in the western Delta around Sa el-Hagar, ancient Sais, utilising the small amount of recently excavated archaeological material[6] dating from the Neolithic until the Buto-Maadi Period and geological data relating to the surrounding floodplain and riverine environment. The preliminary comments presented here may be modified following the analysis and publication of further work in the Prehistoric layers at Sais.[7] The discussion below will test the model which proposes that settlement was focused primarily upon the sand hills (*geziras*) and levees of the Delta plain and attempt to predict possible locations for other early sites in the western and central Delta. It will also deal with the transition from Neolithic ways of life to the agricultural societies of the Buto-Maadi Period and suggest possible reasons for an apparent temporal hiatus in the limited amount of data obtained so far from Sais.

## *Neolithic and Predynastic cultures in Northern Egypt* (fig. 1)[8]

It is likely that environmental conditions in the Delta floodplain could have supported Palaeolithic Period (*c.* 15,000–6,000 BC) occupation in areas of Northern Egypt, following changes in sea level and the subsequent stabilisation of river behaviour in the Nile channels.[9] The presence of Neolithic culture (*c.* 6,000–3,600 BC) in the floodplain itself is also difficult to locate as it is buried under sediment deposits, but the sites in the Fayum and Merimde Beni-Salame on the south-western edge of the Nile Delta suggest that there may have been Neolithic contact or settlement further west into the Nile floodplain, as Merimdans harvested the rich natural resources of the river.[10] The deposition of layers of sediment during the Nile inundations has meant that any remaining archaeological material is buried deeply and can be located only in exceptional circumstances or by deep drill augering carried out at likely sites and in a systematic manner. The earliest material located in this way has been the pottery sherds found in drill cores at Minshat Abu Omar, in the eastern Delta, by Lech Krzyżaniak.[11] In the course of augering away from the Late Predynastic to Early Dynastic cemetery, which

[4] F. Hassan, 'The Dynamics of a Riverine Civilization: A Geoarchaeological Perspective on the Nile Valley, Egypt', *World Archaeology* 29/1. *Riverine Archaeology* (1997), 51–74; K. Butzer, 'Geoarchaeological Implications of Recent Research', in E. C. M. van den Brink and T. Levy (eds), *Egypt and the Levant. Interrelations from the 4th through the Early 3rd Millennium B.C.E.* (London and New York, 2002), 83–97.

[5] W. Andres and J. Wunderlich, 'Environmental Conditions for Early Settlement at Minshat Abu Omar, Eastern Nile Delta, Egypt', in E. C. M. van den Brink (ed.), *The Nile Delta in Transition: 4th–3rd Millennium B.C.* (Tel Aviv, 1992), 157–66; H. de Wit, 'The Evolution of the Eastern Nile Delta as a Factor in the Development of Human Culture', in L. Krzyżaniak, M. Kobusiewicz and J. Alexander (eds), *Environmental Change and Human Culture in the Nile Basin and Northern Africa until the Second Millennium B.C.* (Studies in African Archaeology 4; Poznan, 1993), 305–20.

[6] P. Wilson, 'Sais (Sa el-Hagar), 2001–02', *JEA* 88 (2002), 2–4. A preliminary account of the excavation has been published: P. Wilson and G. Gilbert, 'The Prehistoric Period at Sais', *Archéo-Nil* 13 (2003), 65–72; P. Wilson and G. Gilbert, 'Pigs, Pots and Postholes', *Egyptian Archaeology* 21 (Autumn, 2002), 12–13. I am most grateful to Gregory Gilbert for his analysis of the pottery, the original drawings of pottery and lithic material and his comments in the preparation of this article. I thank Lauren Woodard for the inked drawings, Salima Ikram for the faunal identifications and Jacqui Cotton for her analysis of the environmental samples.

[7] P. Wilson, 'Sais (Sa el-Hagar), 2004–05', *JEA* 91 (2005), 4–8.

[8] I thank for J. R. Dickinson for assistance with the map, after K. Butzer, 'Delta', *LÄ* I, 1047–8, fig. 2; O. Toussoun, *Mémoires sur les anciennes branches du Nil* (MIE 4; Cairo, 1922), pl. 12; M. Bietak, *Tell el-Dab'a*, II (Österreichische Akademie der Wissenschaften Denkschriften der Gesamtakademie 4; Vienna, 1975), 59–74 and Abb. 23.

[9] Butzer, in van den Brink and Levy (eds), *Egypt and the Levant*, 85–6; evidence from the Delta edge: W. Hayes (edited by K. Seele), *Most Ancient Egypt* (Chicago, 1965), 63–4; changing sea levels: D. J. Stanley and A. G. Warne, 'Sea Level and Initiation of Predynastic Culture in the Nile Delta', *Nature* 363 (1993), 435–8.

[10] Andres and Wunderlich, in van den Brink (ed.), *The Nile Delta in Transition*, 164.

[11] 'New Data on the Late Prehistoric Settlement at Minshat Abu Omar, Eastern Nile Delta,' in Krzyżaniak, Kobusiewicz and Alexander (eds), *Environmental Change*, 321–5.

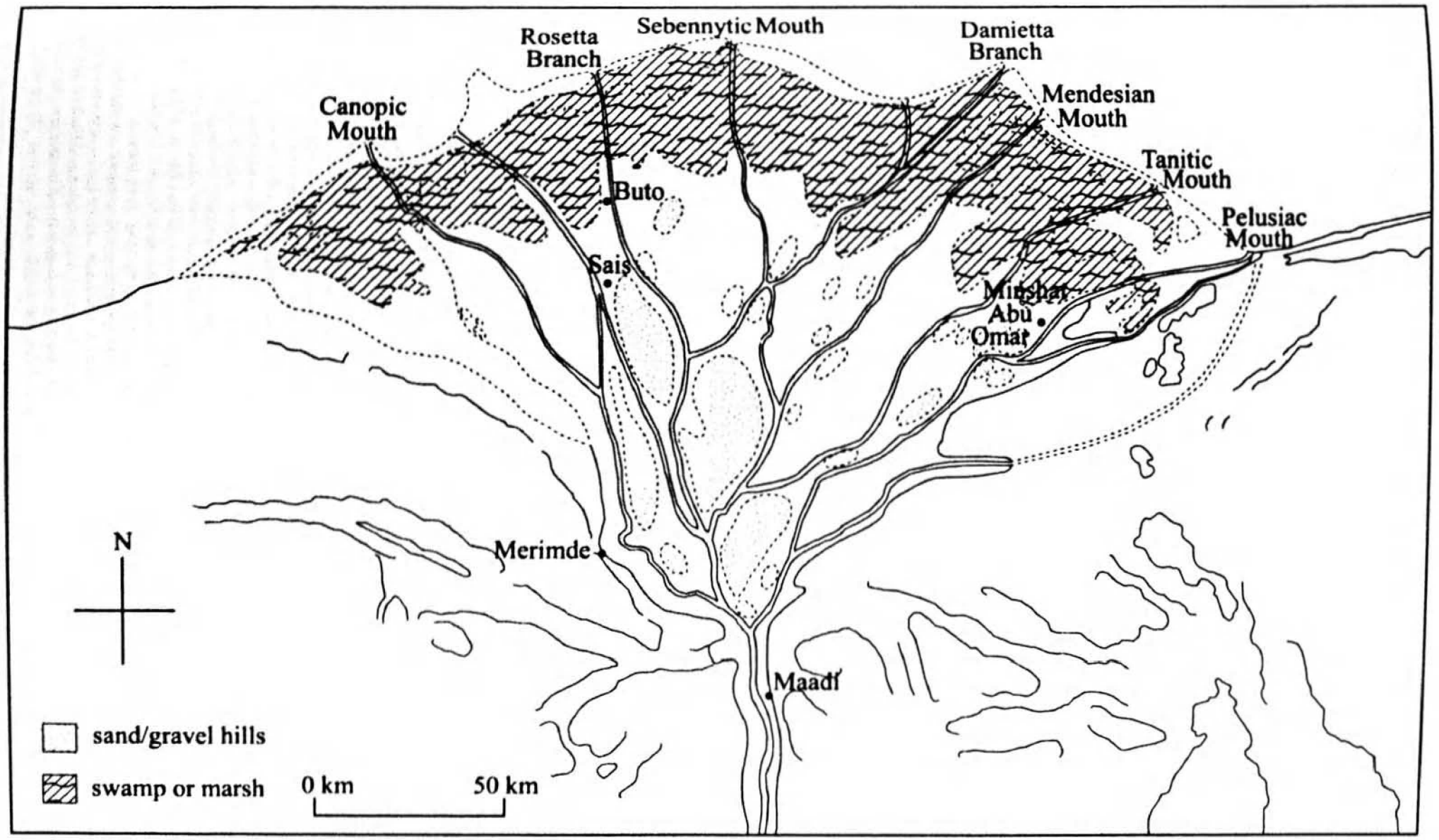



FIG. 1. The Delta, showing sites mentioned in the text (after Butzer, *LÄ* I, fig. 2, and Toussoun, *Mémoires*, pl. 12).

was located upon the top part of a sand *gezira*, the drilling transect moved lower down the *gezira* towards the settlement midden and away from it. The midden was located partially upon the *gezira* and partly upon heavy, dark-violet, organic-rich mud underneath which was a layer of potsherds, lying upon the flat surface of the sand hill. The pottery wares were described as 'rough' and resembling the Neolithic wares of Northern Egypt, that is, those from Merimde. Dates obtained from radiocarbon samples suggested that the pottery was older than 5,700 years BP, and the calibrated range for the samples was between 4,720 and 4,450 BC.[12] Surveys of the eastern Delta[13] have demonstrated that the area was heavily settled in the Early Dynastic Period, partly because of the prevailing geological and environmental conditions. It is therefore possible that if conditions were the same in the earlier Neolithic Period, there may also have been settlement of the *gezira* at that time. The layer of organic-rich mud partially covering the Neolithic sherds identified at Minshat Abu Omar raises questions, however, about the prevailing environmental conditions in the Delta which would have encouraged Neolithic settlement, the extent and nature of that settlement, the locations of the settlements and the reasons for the lack of continuous chronological occupation at sites.

The Minshat Abu Omar material lies in a relatively low position on the sand hill under the site, around 6 m below the current ground level. The low position compared to the higher Late Predynastic areas is consistent with the fact that the sediments of the Nile floodplain have built up over time. The Neolithic material, therefore, would be at a correspondingly lower position on the sand hill as the floodplain would have lain at a lower level around 4,000 BC, perhaps around 2 m below the level of the pottery layer.[14] As sediment was deposited, the floodplain would have risen, so that by the end of the Predynastic Period, the settlement must have been higher up the slopes of the *gezira*, with the cemetery on top of the sand hill, in order that both could stay clear of the flood waters.[15] Estimates of sedimentation rates based on the dating of carbon samples from drill augers in the northern and eastern Delta suggest that the deposition of sediment may have averaged a rate of 1.5 mm each year.[16] In this case, in the 900 years between 4,400 BC and 3,500 BC (the Late Neolithic to Buto-Maadi Period), around 1.35 m of sediment would have been deposited. This is not a significant amount of sediment and suggests that settlements could have continued to exist in the same places and, over the period of time between the cultural phases of the Neolithic and Buto-Maadi Period, moved up the sides of the *gezira*. Theoretically such a scenario is possible at Minshat Abu Omar but the fact that the two cultural strata are separated by heavy, dark-violet mud, suggests that another alternative is more likely. It seems that between the two cultural phases environmental conditions changed. Either the area was flooded and became marshy, or an ox-bow lake or a lagoon had formed against the *gezira* for a period of time. Later, when the conditions causing this marsh or lake had changed again, people returned to the high sand *gezira* and the Late Predynastic–Early Dynastic settlement, excavated by the Munich Museum Expedition,[17]

[12] Andres and Wunderlich, in van den Brink (ed.), *The Nile Delta in Transition*, 160–1.

[13] E. C. M. van den Brink, 'A Geo-Archaeological Survey in the North-Eastern Nile Delta, Egypt; the First Two Seasons, a Preliminary Report', *MDAIK* 43 (1987), 7–31; E. C. M. van den Brink, 'Settlement Patterns in the Northeastern Nile Delta during the Fourth–Second Millennium B.C.', in Krzyżaniak, Kobusiewicz and Alexander (eds), *Environmental Change*, 279–304.

[14] L. Krzyżaniak, 'Again on the Earliest Settlement at Minshat Abu Omar', in van den Brink (ed.), *The Nile Delta in Transition*, 151–5.

[15] Andres and Wunderlich, in van den Brink (ed.), *The Nile Delta in Transition*, 160 fig. 3.

[16] Andres and Wunderlich calculated a rate of 1.5 mm per year at Minshat Abu Omar (in van den Brink (ed.), *The Nile Delta in Transition*, 159). Ball had suggested a rate of between 9 cm and 13.2 cm per century (that is, 0.9 mm to 1.32 mm a year) (J. Ball, *Contributions to the Geology of Egypt* (Cairo, 1939), 173–6). Based on estimates from sediments at Minshat Abu Omar, a rate of 1.45 mm a year in the late Holocene was suggested by Butzer, in van den Brink and Levy (eds), *Egypt and the Levant*, 90. Chen and Stanley suggested sedimentation rates of 5.9 mm a year between *c.* 5,400 and 3,700 BC, but 1.9 mm after that in the northern Delta plain (Z. Y. Chen and D. J. Stanley, 'Alluvial Stiff Muds (Late Pleistocene) Underlying the Lower Nile Delta Plain, Egypt—Petrology, Stratigraphy and Origin', *Journal of Coastal Research* 9/2 (1993), fig. 14). It is accepted that there are many variables affecting sedimentation and that it varies considerably in different places and at different times.

[17] K. Kroeper and D. Wildung, *Minshat Abu Omar. Ein vor- und frühgeschichtlicher Friedhof im Nildelta*, I–II (Mainz, 1994 and 2000).

was founded there. It may be that between the last Neolithic material around 4,450 BC and the first Predynastic phase around 3,500 BC,[18] the local environment altered due to higher floods, perhaps caused by increased rainfall in central Africa.[19] Indeed, Krzyżaniak suggested that the comparable later layer of black mud located in the drill augering had been caused by the very high Nile floods documented in medieval times.[20]

The identification of the Minshat Abu Omar settlement sequence might suggest that areas where Predynastic material has already been found will prove also to have earlier cultural material. If such is the case, Buto in the central northern part of the Delta would be a possible location for Neolithic settlement. As yet, however, the earliest material from Buto and the nearby site of el-Qerdahi[21] is Buto-Maadi Stratum I material dated to around the first quarter of the fourth millennium BC[22] both on the basis of a radiocarbon date[23] and also by comparison with the Chalcolithic Ghassulian type of pottery found in the stratum. The pottery wares from Stratum Ia at Buto can be divided into two main groups. The first type is characterised by uneven, thick-walled vessels with organic temper. They were handmade, polished on the outside and varied in colour from black to grey and brown to red. The second group comprised thin-walled pots with predominantly sand temper and made on a turning device. They were decorated with white-painted stripes or with plastic additions, such as knobs, ledges or lug handles, or rims which had been pinched to create a pie-crust effect. Although the vessels are made from Nile silts, they have non-Egyptian forms such as hole-mouth jars, V-shaped bowls, pie-crust rim vessels and bowls with fenestrated pedestals. Stratum Ib shows a process of adaptation by the people at Buto and a break with Palestinian contacts. The tradition of the Buto Stratum Ia pottery is therefore Neolithic—functional and adapted to local conditions[24]—though there may be a connection between Badari and Buto Ia through the 'black-topped' wares.[25] Stratum II pottery seems to resemble that of Maadi, including ledge-handled vessels, globular, polished pots and a type of closed vessel with a possible flax temper. The phase is marked at Buto by closed vessels with 'rocker-stamp' decoration in rows. Faltings suggests that Buto IIa is the same date as Naqada IIa–b and that Buto IIb parallels Naqada Iic–d1.[26]

The Buto material and studies of it have provided an excellent framework for Lower Egyptian Predynastic sequences, into which material from other sites can be fitted. It has also suggested that by the Chalcolithic Period in the north, contemporary with Naqada I–II in Upper Egypt, there was contact between Buto and the Levant, Upper Egypt and Maadi, perhaps mostly based on its strategic trading location.[27] It seems that Buto was not isolated and it is possible that earlier, Neolithic cultures will emerge to demonstrate adaptation to local conditions as well as maintaining broader contacts.[28] The non-sedentary nature of Neolithic lifestyles perhaps suggests that there was a fluidity in cultural dispersion compared with the more 'stationary' Predynastic cultures.

[18] Andres and Wunderlich, in van den Brink (ed.), *The Nile Delta in Transition*, 160–1.

[19] R. Said, *The River Nile* (Oxford, 1993), 131–3 suggested that there was an 800 year period of low Niles from around 3,900 to 3,000 BC, when the connection between the Nile and Fayum was severed.

[20] Krzyżaniak, in Krzyżaniak, Kobusiewicz and Alexander (eds), *Environmental Change*, 324, based on the discussion of F. Hassan, 'Historical Nile Floods and Their Implications for Climatic Change', *Science* 212 (1981), 1142–5.

[21] J. Wunderlich, T. von der Way and K. Schmidt, 'Neue Fundstellen der Buto-Maadi-Kultur bei Ezbet el-Qerdahi', *MDAIK* 45 (1989), 309–18.

[22] Most recently discussed by D. A. Faltings, 'The Chronological Frame and Social Structure of Buto', in van den Brink and Levy (eds), *Egypt and the Levant*, 168.

[23] The range of the calibrated dates is 3,883–3,812 and 4,340–3,900 BC (T. von der Way, *Tell el-Fara'in. Buto*, I (Mainz, 1997), 82, sample KN 4015).

[24] Faltings, in van den Brink and Levy (eds), *Egypt and the Levant*, 165–70.

[25] T. von der Way, *Untersuchungen zur Spätvor- und Frühgeschichte Unterägyptens* (Heidelberg, 1993), 34.

[26] Faltings, in van den Brink and Levy (eds), *Egypt and the Levant*, 167–8.

[27] Von der Way, *Untersuchungen*, 67–91; C. Commenge and D. Alon, 'Competitive Involution and Expanded Horizons: Exploring the Nature of Interaction between Northern Negev and Lower Egypt (*c.* 4500–3600 BCE)', in van den Brink and Levy (eds), *Egypt and the Levant*, 139–53.

[28] The mobility of Neolithic hunter-gatherers against the sedentarism of farmers is discussed by P. Bellwood, *First Farmers. The Origins of Agricultural Societies* (Oxford, 2005), 31–43, and the change to agriculture in Egypt is discussed in W. Wetterstrom, 'La chasse-cueillette et l'agriculture en Égypte: la transition de la chasse et de la cueillette à l'horticulture dans la vallée du Nil', *Archéo-Nil* 6 (1996), 50–75.

Other Predynastic Delta sites such as Minshat Ezzat and Tell el-Farkha in the central Delta have so far only provided substantial evidence for the early settlements of the north of Egypt in the dynastic period, but may well prove to have underlying earlier archaeological strata. In the western Delta, Sais was believed to have been an important Early Dynastic cult centre of the goddess Neith and perhaps the main city of a Lower Egyptian kingdom. Such assumptions have been made on the basis of interpretations of inscribed material from Upper Egypt,[29] however, and one of the original aims of the EES project at Sais was to determine whether there was any archaeological evidence for early settlement at the site. The survey work detected evidence for Prehistoric material which was further investigated in a series of ongoing excavations.[30]

## Sais (Sa el-Hagar)

The presence of Prehistoric material at Sais was located, as at Minshat Abu Omar, by initial drill auger transects made across the site in order to ascertain the location of settlements and geomorphic features. The material was found in the area of the 'Great Pit', which is the last remnant of the site of the Twenty-sixth Dynasty city of Sais. It has been excavated since antiquity for its stone and *sebakh*. In the last one hundred years, the 'Great Pit' has been created by the large-scale removal of *sebakh*, perhaps used for flood embankments or land reclamation in the area. An average of around 3.5 m of earth has been removed from an area of 450 m by 400 m, reducing the ground surface and revealing the lower foundation elements of some Twenty-sixth Dynasty buildings, along with the top of the pre-construction phase of the sites cleared in the Saite Period, when builders seem to have cleared and flattened the 'Great Pit' area to provide new foundations for their monuments.[31] With the subsequent removal of the Saite Period material, the lowest foundation layers have been exposed, along with the land upon which they were built. The underlying layers contain material dating to the Prehistoric and Predynastic Periods and the layers had been flattened off in some places, creating a level surface boundary between some of the Late Period debris and the underlying Prehistoric strata. Nothing dating to the intervening three thousand years was found in either the drill auger or excavation work. The area lies below the water table and is also subject to the dumping of waste water from the village nearby. The sub-surface matrices and archaeological layers are therefore waterlogged with alkaline water. The local conditions seem to have affected the preservation of all of the material, so that pottery has been water-eroded, salt-corroded and is subject to colour changes due to the salts, while the bone in some cases has been almost completely mineralised. Some charcoal has survived and a few seeds were obtained from the samples taken. The preservation of material seems to be inconsistent, however, and may be due to the precise nature of the salt content or contamination in specific areas.

In the augering work in 1999, drill core 15 contained four sherds of identifiable Prehistoric pottery: three joining sherds from the rim of a black-topped, red-bodied jar; a black-burnished, Nile silt body sherd from a jar;[32] and a red-burnished, sand-tempered, Nile silt body sherd.[33] The material came from a depth of 7 m below the ground surface in the 'Great Pit' (fig. 2). Although the upper layers had also contained pottery, some of it burnished, there was a clear distinction between the layers, including a clay layer between upper and lower pottery-bearing strata. In addition, the pottery from the deeper cores was

[29] Sais has been described as the chief city at the time of the unification of Egypt by W. B. Emery, *Archaic Egypt* (Harmondsworth, 1961), 42 and as a 'significant' centre by T. A. H. Wilkinson, *Early Dynastic Egypt* (London and New York, 2001), 325.

[30] Wilson, *JEA* 91 (2005), 4–8.

[31] P. Wilson, *The Survey of Sais (Sa el-Hagar), 1997–2002* (EES Excavation Memoir 77; London, 2006), 197 and 204. This also seems to have happened at Buto, which Butzer takes as an indication that particular parts of the site were not occupied between Early Dynastic and Saite times. As at Sais, this is not necessarily the case.

[32] All from drill 15, core 46.

[33] From drill 15, core 43.

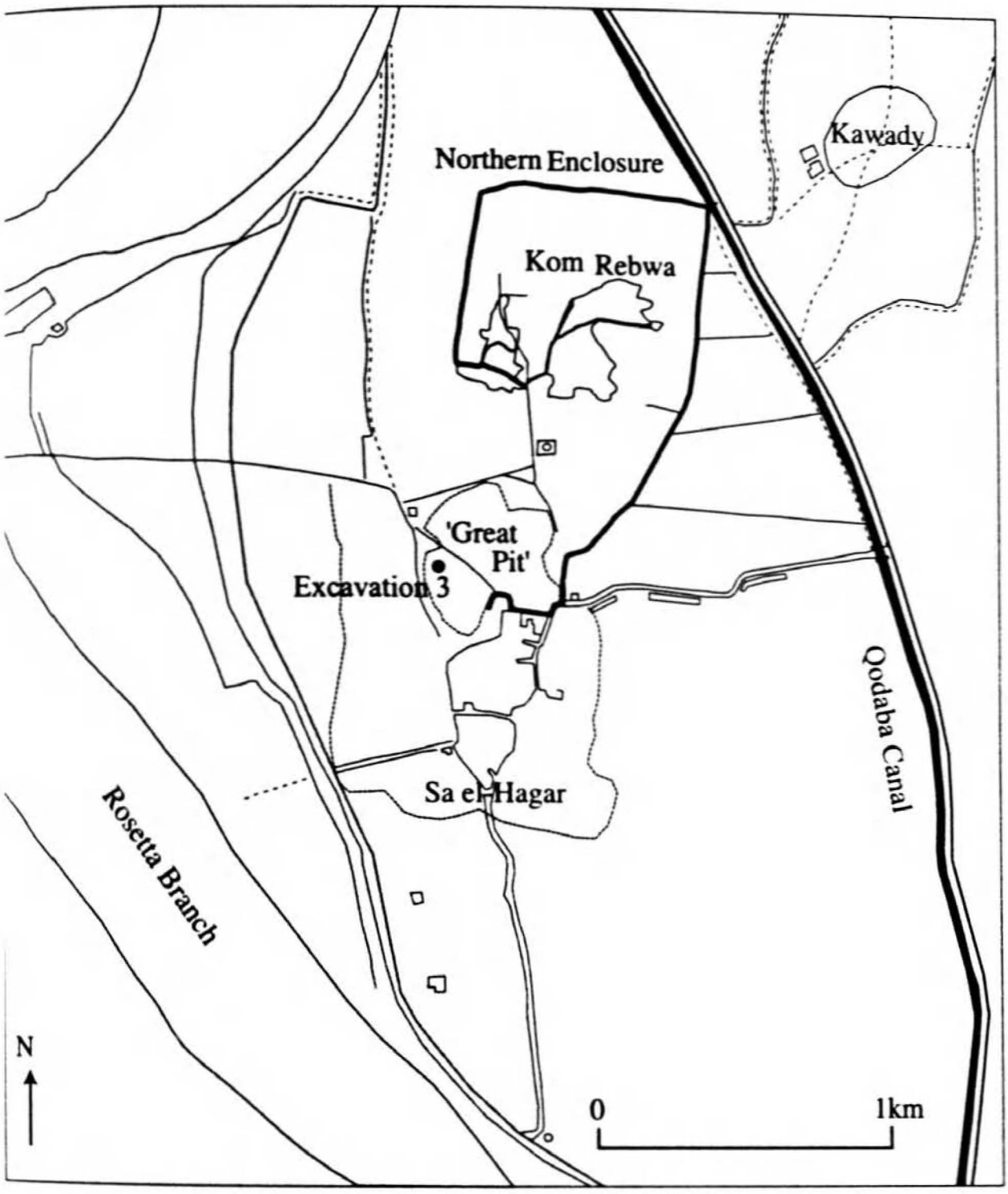



FIG. 2. Map of the Sa el-Hagar area, showing the location of the 'Great Pit' and Excavation 3.

contained within the centre of the core. It was unlikely, therefore, to have fallen down the drill hole and contaminated the sample. It seems that the pottery was from the Neolithic strata, while the upper material from a depth of 1.25 to 3.15 m is the Buto-Maadi layer. A test trench (Excavation 2), made in 2000,[34] confirmed that the Prehistoric material lay in potentially stratified layers buried not too far below the lowest ground surface at Sa el-Hagar, but still below groundwater level. Some of the sherds located in this test also suggested that Upper Egyptian imports may be present in the Buto-Maadi material. In particular, a sand-tempered rim sherd from a closed ovoid vessel, with red slip and vertical and oblique polishing strokes is possibly similar to sherds from vessels known at

[34] P. Wilson, 'The Survey of Sais (Sa el-Hagar), 2000–01', *JEA* 87 (2001), 4–5 Excavation 2.

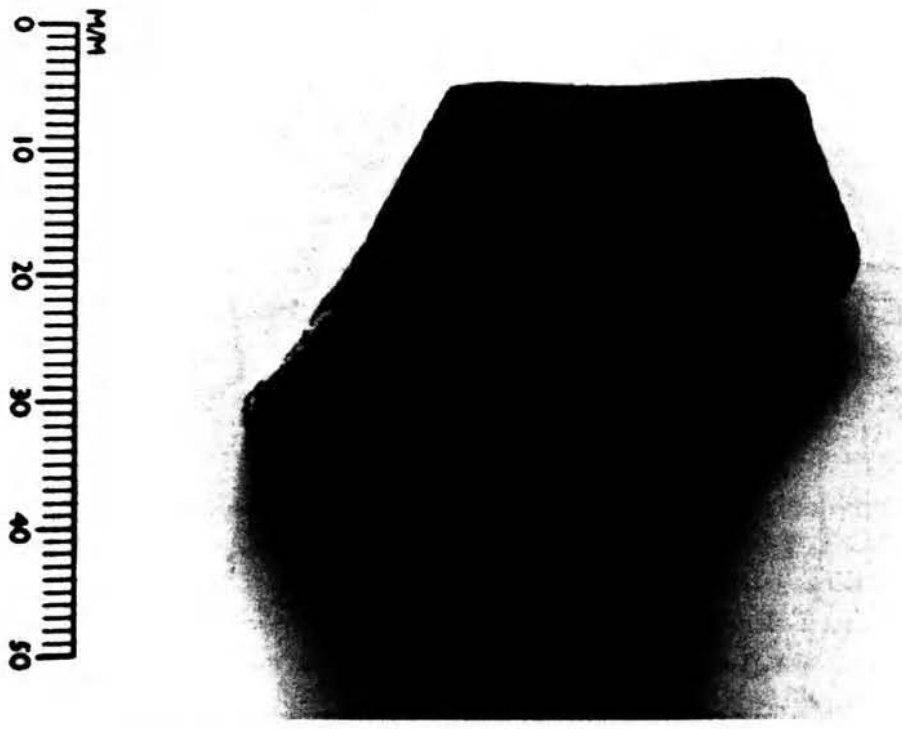



FIG. 3. Red-polished sherd from a closed jar, Excavation 2.

Hierakonpolis (fig. 3).[35] In order to assess the feasibility of excavation in that area and to test the nature of the Prehistoric material,[36] Excavation 3 was undertaken in 2001 using a sump and small irrigation pump.[37]

The area chosen for Excavation 3 was very close to the reed beds of a marshy part of the 'Great Pit' (fig. 2), lying at an approximate height of around 1 m above sea level.[38] Water seeped into the excavated area from a depth of around 50 cm, but it was relatively easy to contain the rate of flow until around a depth of 1.5 m, when work became too difficult. The ground surface was slightly sloping, being higher on the southern edge and sloping down towards the north, though the difference in elevation from one side to another was minimal. In order to take advantage of the natural slope, the sump was situated in the north-western corner of the trench. The surface of the land was covered in coarse grass and, after this had been removed, the soil matrix comprised soft, sandy silt which had been disturbed and pitted. The pits contained a mixture of broken Saite Period and Ptolemaic pottery, along with fragments of broken and burnt limestone, some red-brick and a few small fragments of faience. This material most likely derives from the destruction of buildings in this area, perhaps during the Twenty-sixth Dynasty. Further excavation work in 2005[39] suggests that there were monumental and sacred buildings in what is now the 'Great Pit' and surrounding fields, as well as urban dwellings and perhaps industrial workshop zones. The pits at the top levels of Excavation 3 contained dumped, burnt material mixed with the pottery, a feature of the whole of the western side of the 'Great Pit'. The layer of Late Period debris at this part of the 'Great Pit' was very thin, however, suggesting that the location of the trench was

[35] Personal communication from Ulrich Hartung. It is similar to the Hierakonpolis closed vessel Type 2a and fabric 22: fine, untempered: B. Adams, *Excavation in the Locality 6 Cemetery at Hierakonpolis, 1979–1985* (BAR International Series 903; Oxford, 2000), 12.

[36] The larger Excavation 8 was undertaken in 2005 as part of the 'Sais and its Hinterland' AHRC funded project; see the field report Wilson, *JEA* 91, 4–8.

[37] The excavation was supervised by Gregory Gilbert, Nicola Harrington and Fatma Rageb Kamal; see P. Wilson, 'Survey of Sais (Sa el-Hagar), 2001–02', *JEA* 88 (2002), 2–6. I am grateful to the Supreme Council for Antiquities in Cairo and Tanta for their cooperation and support for the work.

[38] The ground level height is on the 5 m contour line, according to *Survey of Egypt* maps of the area and the base of the 'Great Pit' lies below this level. The area was surveyed by the EES Mission in 1997; see Wilson, *The Survey of Sais*, 118–48.

[39] Wilson, *JEA* 91, 4–8.

at the base of this destruction layer and the interface between it and the earlier Buto-Maadi material. It was remarkable that there was nothing dating to the intervening three thousand years between the two layers. It suggests that the area had been extensively cleared for reuse in the Saite Period.

*The Prehistoric phases*

The Prehistoric layers at Sais can be divided into three main phases (figs. 4 and 5), distinguished by soil matrix colour and texture, as well as the pottery and objects, including a brick, a pottery bull-horn and stone pounders. The phases were contained within several contexts:

| *Phase* | *Contexts* | *Suggested Date*[40] |
|---|---|---|
| Saite Period | [3000] | Twenty-sixth Dynasty, *c.* 550–525 BC |
| Mixed Interface | [3001] | |
| Sais III | [3002–4], [3007] | Buto-Maadi Period, *c.* 3,500 BC |
| Non-settled phase | [3005–6] | |
| Sais II | [3008], [3009–10], [3011–12], [3013–14] | Later Neolithic, *c.* 4,500–4,300 BC |
| Sais I | [3015–16] | Early Neolithic, *c.* 5,000–4,800 BC |

The layers nearest to the ground surface all demonstrated a small amount of disturbance, caused by the intrusion of several later pieces of pottery. This may have been due to material falling into fissures in the sandy-silt matrix, as well as to pits driven down into the softer earth, or to bioturbation or compaction of the sandy-silt matrix, which allowed the pottery to migrate down through it when saturated with water.[41] The upper matrix of [3001] had a higher clay content than the lower layers, particularly on the eastern side of the trench. It contained some roots from surface plants and grass and only a few fragments of pottery. Most of the sherds were very weathered, coarse Nile silt wares, with some red-brown burnished sherds. Many had lost their surfaces and the breaks on the sherds were extremely worn. The condition of the pottery seems to have been due to salt action and the alkaline nature of the soil. Once the sherds were exposed to the air and dried out, some of them began to crumble. Others lost the polish on their surfaces during the washing process, when the high burnish was particularly fugitive. Samples of pottery were soaked in water, which was changed at intervals of three hours in order to desalinate the sherds over a period of 48 to 72 hours. The process may have stablised some of the pottery, but much of the water and salt damage had already occurred when the sherds were in the ground. Some of the burnished sherds survived in excellent condition, however, especially the finer wares. The condition of the pottery, therefore, means that a thorough statistical survey of the material is difficult on the basis of studying burnished and unburnished sherds or even of diagnostic sherds. Sometimes it was unclear if a sherd was from a rim or whether one of its broken edges had been worn to resemble a rim, or whether a rim had been worn away to such an extent that it resembled an edge. Counting the numbers of sherds on the basis of burnish or frequency of diagnostic types would not have been useful, as the numbers of such sherds

[40] The dates are based on the pottery and lithic comparisons outlined on pp. 87–9 and 91–5.

[41] Butzer, in van den Brink and Levy (eds), *Egypt and the Levant*, 92.

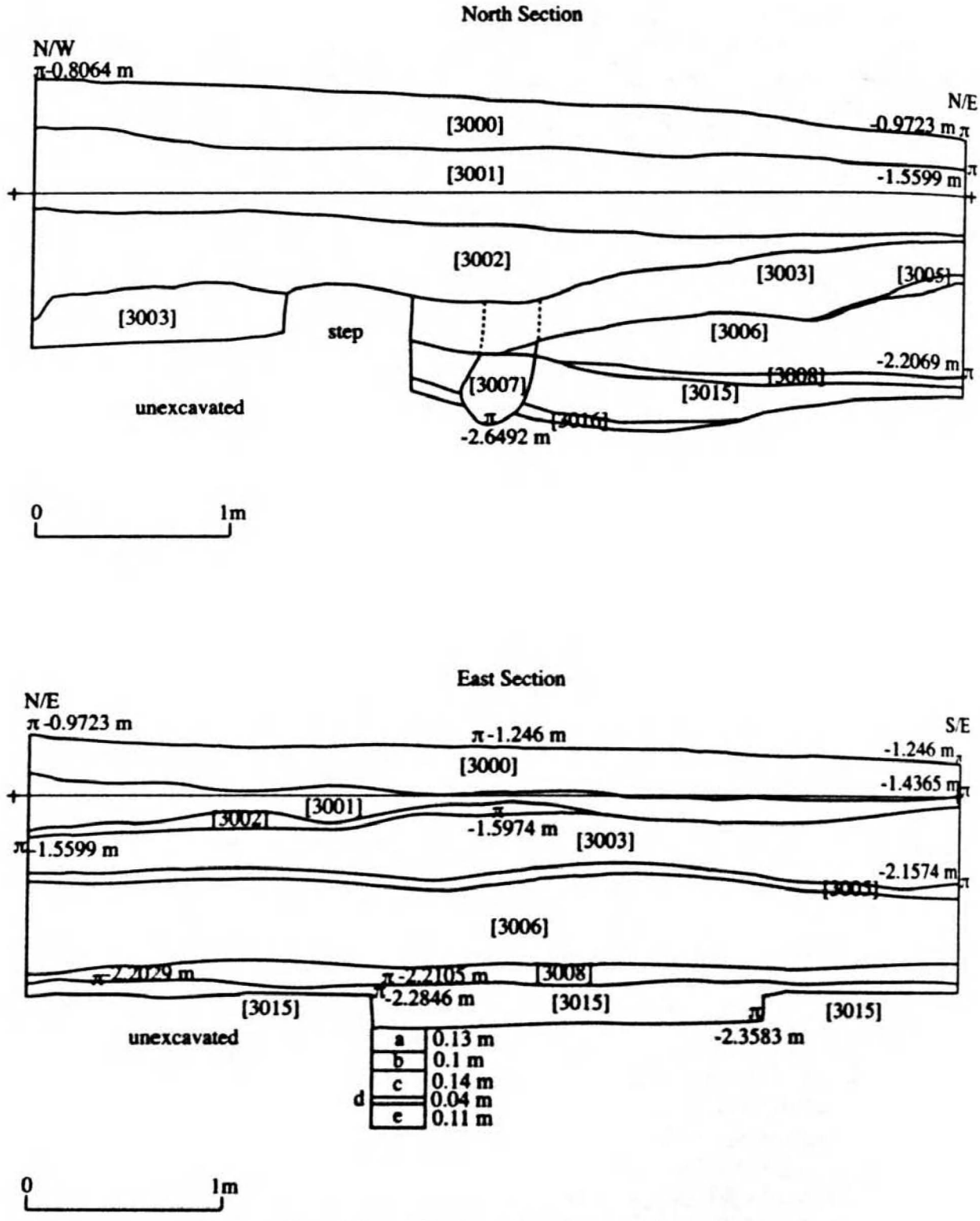



FIG. 4. Excavation 3, north and east sections.

could only have been estimated and the sample was relatively small. The statistical analysis in this report was carried out based on the quantification and comparison of ware types only.

*The mixed interface layer [3001]*

Context [3001] was a mixed sandy-silt matrix, with a band of brown-orange staining dividing it from the Saite Period layer [3000]. This brown-orange stain was iron oxide and could indicate that the area was exposed to the atmosphere at some time.[42] The matrix itself

[42] A. el-Shahat, H. Ghazala, P. Wilson and Z. Belal, 'Lithofacies of the Upper Quaternary Sequence of Sa el-Hagar Area, Gharbiya Governorate, Nile Delta—Egypt', *Journal of Geology and Geophysics, Mansoura University* 32/1 (2005), 82.

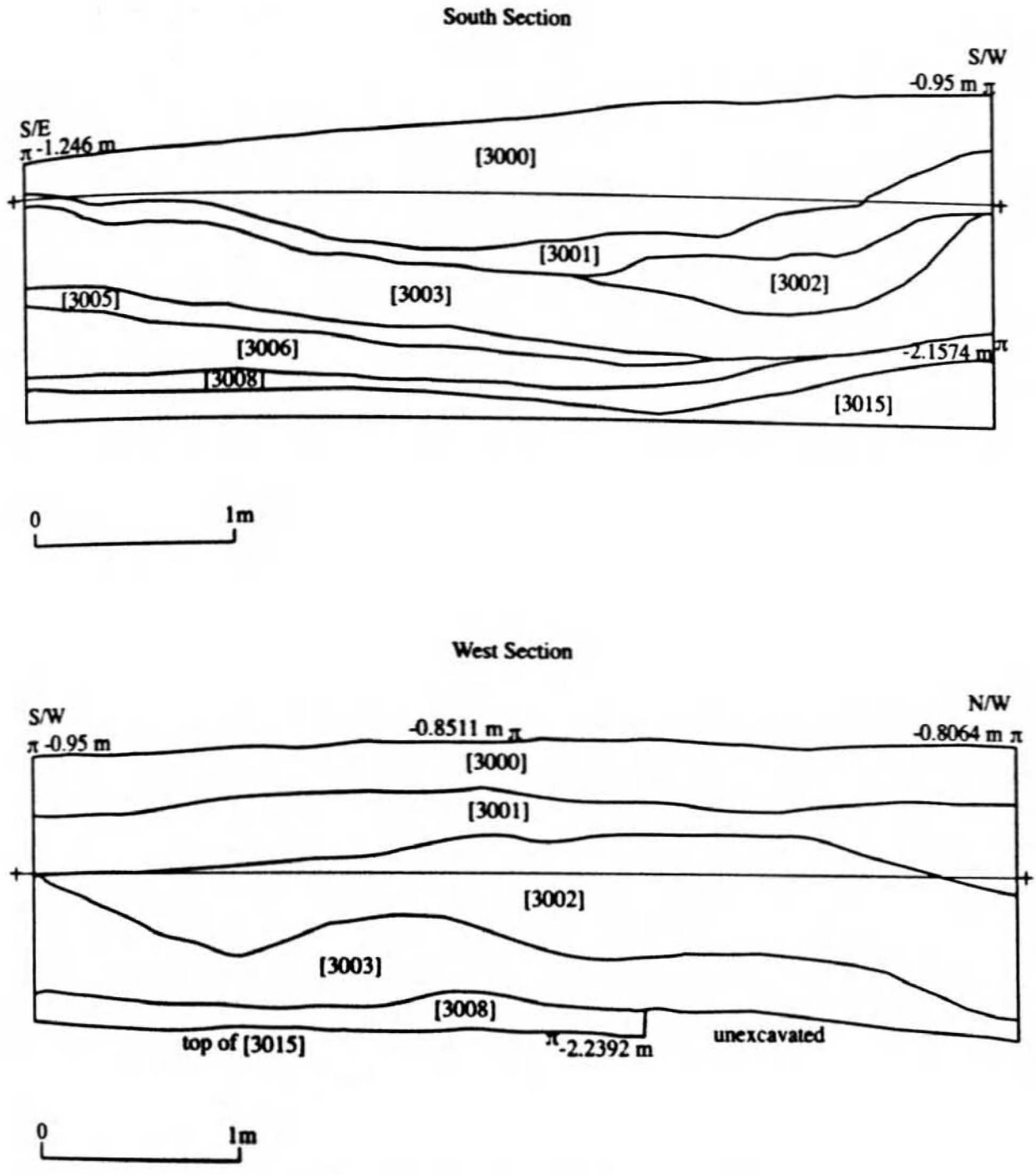



FIG. 5. Excavation 3, south and west sections.

contained carbonate nodules and white limestone or salt flecks, suggesting that plants once grew in this location, in semi-arid conditions.[43] There were a number of pottery sherds from this context. The wares and finish of some indicate that they were Prehistoric in date, but there were also Saite Period sherds mixed in with them. The presence of large amounts of chaff in the Nile silt mixture and the typology of some of the sherds enabled the Saite examples to be separated from the Predynastic pottery. It was not possible to date the numerous extremely worn sherds, however, so it was difficult to include this context with the other statistical data. Two fired 'bricks' were found near the top of context [3001] but did not seem to be related to any mud-brick features or other material. They could have been the remnants of a mud hearth-surround, fired *in situ*. The bricks resemble a similar example from [3002] and those found later in Excavation 8 and may be compared to those from Buto

[43] J. D. Collinson, 'Alluvial Sediments', in H. G. Reading (ed.), *Sedimentary Environments: Processes, Facies and Stratigraphy* (Oxford, 2004), 56.

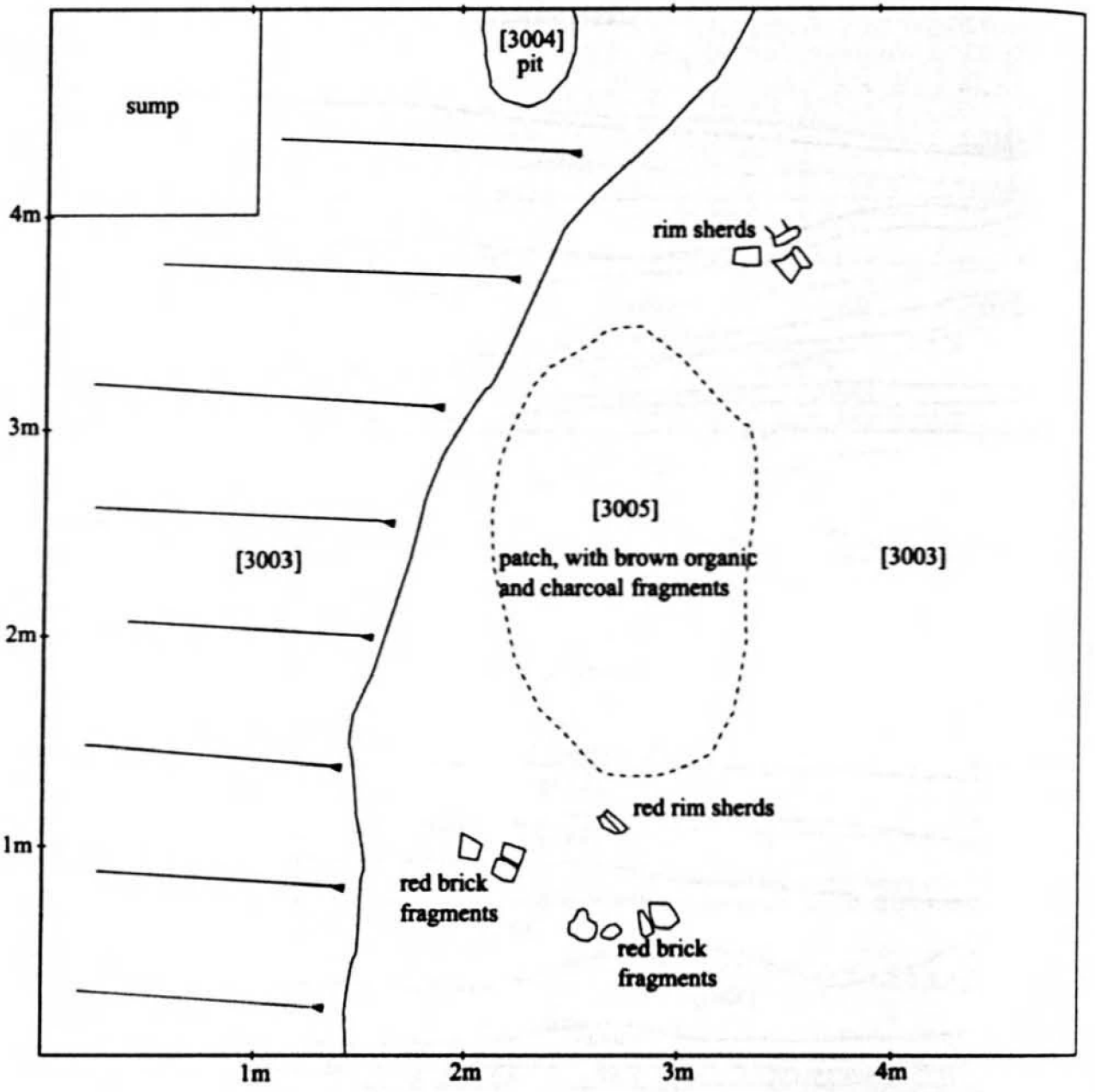



FIG. 6. Excavation 3, Phase Sais III, Buto-Maadi Period.

(see p. 88). The base of a limestone vessel was also discovered in this context, but it is probably from the Late Period and belongs to the disturbed level above. There seemed to have been a certain amount of disturbance from above in this layer, and the Late Period material could not be separated stratigraphically from the Predynastic pottery and objects.

*Phase Sais III [3002]–[3004] and [3007]* (fig. 6)

Context [3002] was identifiable as a deposit of silty sediments containing organics, possibly once a stagnant pool supporting reeds or aquatic plants. The layer was uneven in depth and extent, and deeper on the northern and western sides of the trench. There seems to have been a pool or marshy sump lying against a higher sandy hillock in the south-eastern side of the trench. The nature of the layer was deduced from the distinctive grey-black colour with red-brown patches, which undulated over the top of the succeeding context [3003], thus sealing it. In places there were concentrations of black oxidised material. Weathered pottery fragments were found in this context and larger fragments of degraded red-brick or coarse

pottery were noted at the bottom of [3002] and above [3003], particularly on the southern side of the trench. A piece of basalt and fragments of limestone were also found in this layer, perhaps intrusive material from above. In the south-eastern part of the trench [3003] directly succeeded [3001], and it was likely that there was a degree of disturbance of areas of this layer not protected by the marshier context [3002], resulting in a few Saite Period sherds occurring in the sample.

Context [3003] appeared to be sealed by contexts [3001] and [3002], with no contamination from the upper disturbed layers. Carbonised roots in the upper western section of the transitional phases continued downward into [3003]. The context was a yellow, sandy-silt matrix with patches of organic deposits. The layer sloped down from the east to the west, forming the sandy hillock in the south-eastern corner of the trench. In the centre of [3003] there was an area of darker coloured material [3005], consisting of organic brown patches with charcoal fragments. Pottery sherds were concentrated on the lower, eastern side of this layer and occurred less frequently on the western, higher side.

*Pottery (see Appendix)*: The sherds collected included rims, bases and decorated and burnished sherds, although it was not possible to count the burnished material accurately. There was a range of bowl shapes including V-shaped, straight sided bowls ([3002].1), bowls with rounded or flat bases and a slightly everted rim ([3002].3–4; [3003].7–9), bowls with everted rims, some large in size ([3002].5–7; [3003].5 and perhaps 6, 10), and bowls with slightly inverted rims ([3003].1–4). Some large sherds may have come from trays or vessels built in the ground and fired *in situ* ([3002].2). The closed forms included some large storage vessel types ([3002].8; [3003].11–12) and small storage types ([3003].19–20), as well as smaller necked vessels ([3002].9–11; [3003].13–18). The bases were either flat bowl bases ([3002].12; [3003].22) or pointed bases on small necked flasks ([3002].13; [3003].23), with one example perhaps of a pointed bowl base ([3003].24).

The decorated and diagnostic sherds can be paralleled with examples from Buto in particular. The impressed-dot pattern ([3002].15, [3003].25) occurs on sherds from Buto Level II–IIa.[44] At Buto, V-pattern dot patterns usually occur on the shoulders of closed vessels, near the rim. The V-patterns are arranged in bands, where the base of one V almost meets the base of another. On the best example from Sais ([3002].14), the base of the V comes down to meet a horizontal band, suggesting that V-patterns and horizontal bands could occur on the same vessels. There may have been rows of V-shapes alternating with horizontal bands lower down the body of the whole vessel. The overall pattern may have been intended to imitate basketry, both in the design of interwoven bands and the texture of the pottery created by the decoration. The half-moon, 'fingernail' impressions of sherd [3003].26 occur on shallow bowls distinctive for Buto Level II.[45] The fine, burnished sherd [3003].21 was too small to identify the type of vessel from which it may have come, but there is a possibility that it was an Upper Egyptian import from a straight sided, fine-ware cup.[46]

The closed jar rim types from Phase Sais III (especially [3002].11 and [3003].13–14) are also found in Buto Level II. At Sais, pointed bases [3003].23–4 also belong to these vessels, which may have been small drinking jars, and occur in Buto Level II.

*Objects*: The most distinctive object from Phase Sais III was a fired mud, model bull-horn [3003].27. It was a rolled cylinder of mud, thicker at one end, which was broken and tapered to an upturned point at the other end. The object could be a human leg with the foot, but seems more likely to have represented a horn from the figure of a bull or cow with long horns. Most of the later Merimde examples of cattle horns come from animals with short,

[44] Von der Way, *Buto* I, Taf. 39, 19–22.

[45] The angle of the Sais example may need to be adjusted from that shown in the drawing.

[46] Adams, *Excavation in the Locality 6 Cemetery*, 11, fabric 22 and type 1d.

rounded horns, but there are also examples of horns from long-horned cattle. These types are found in Merimde Level II–III phases.[47]

The fired mud-'brick' [3002].16 was smoothed and eroded with a flat side. In section it had a hemispherical shape, suggesting that it had been deliberately fashioned. Other less well-preserved fragments of bricks were also found in this Phase Sais III. They may be similar to the bricks published from Buto, where burnt 'bricks' were found layered in three courses and formed at least four parallel rows in TeF87TIX, Building phase IIId, dating to Naqada IIIa1 or 2.[48] These bricks are described as being hand-made from very porous mud and blue-grey in colour, with the complete bricks measuring up to 30 cm in length. Fireplaces could have been made in the form of shallow pits dug into the ground and protected on the outside by a ring of mud. During cooking this outer ring was fired to create a kind of hearth-brick. With the subsequent disturbance of the site, the 'bricks' were broken away and appear in the archaeological record as individual objects, whereas their manufacture was accidental. Such a process could account for the presence of the bricks in Phase Sais III. The regular size of the bricks, however, and their rounded shape suggests that they were purposely designed as bricks, rather than being formed as a by-product of heating a cooking vessel. The firing of larger bricks was not a major technological development, but their utilisation for specific purposes in building construction seems to have been a conceptual and functional development. The evidence from Sais and Buto suggests that fired bricks were used for certain purposes, but houses continued to be built from mud-brick, perhaps because of the heat retention properties of the mud in winter and cooling effect on the house in summer. The firing of large quantities of bricks would have required considerable amounts of fuel, and the lack of availability of wood compared to the availability of mud and stone may have meant that it was more economically viable to continue to build from mud and to make monumental structures from mud-brick or stone, even in the Delta.

A number of fragments of red and brown quartzite were found in Phase Sais III along with a complete pounder or grinder [3004].1. The quartzite fragments were mostly in small chips and were sorted and weighed:

[3002] fragments of red and brown quartzite, weight 338 g

[3003] fragments of red, yellow and brown quartzite (some red fragments have flat surfaces), black/grey fine-grained stone; white, water-washed pebble, weight 520 g

[3006] fragments of red, yellow and brown quartzite, weight 117 g.

The fragments may come from pounders or grinders similar to the complete example. This suggests that the pounders were used for percussive purposes, that is, striking other stones or tools. It may also suggest that stoneworking and lithic preparation were undertaken at Sais on materials brought from further afield. The nearest source for quartzite was probably Gebel el-Ahmar, to the south near modern Cairo. Its presence may suggest that there are links with the southern Delta area. More detailed analysis is required of the fragments of red and brown quartzite, to ascertain their exact use. Due to the colour of the stone and the presence of so many chips, it could be possible that this type of stone was used to strike sparks and create fire. The colours of the stones, red and orange-brown, may also have been significant for such a function. A combination of flints and quartzite may also have generated sparks, accounting for the quartzite chips and the absence of tools, other than pounders, made from the stone. Some of the white quartzite pebbles may have been used for burnishing pottery as they have very smooth, hard surfaces.

*Lithics*: The majority of the worked flint and chert fragments retrieved from the upper strata of Excavation 3 were small flakes and chips. Some may have been intended for use without

[47] J. Eiwanger, *Merimde–Benisalâme*, III. *Die Funde der jüngeren Merimdekultur* (Mainz, 1992), 127–8, pls. 89–90, no. III.168.

[48] Von der Way, *Buto* I, 119–22 and figs. 62–3.

further working, but a few examples showed signs of retouching (for example, [3002] L.47) and worked edges, such as two microblade fragments, [3001] L.1 and [3002] L.48. Although only a small sample of flint tools survived from Phase Sais III, no bifacial arrowheads or sickle blades were found. A discontinuity, therefore, would seem to have existed in the lithic industry, as in the Late Neolithic Fayum, and this suggests that lithic technology at Sais was within the Chalcolithic–Lower Egypt phase, as determined at Maadi.[49] Further analysis may determine the origin of the raw materials and so demonstrate connections to the west or south.

*Fauna*: Amongst the faunal material there were the bones of cattle, *Clarias*-catfish, *Synodontis* and pigs, some of which were identifiable as juvenile animals. In general, the bone assemblage was burned with much charring and blackening and, in some cases, bones were completely whitened by exposure to heat.

*Flora*: Fragments of charcoal were noted in the excavation and recovered from the environmental sample along with charred cereal remains, which could not be more definitely identified. Initially, the data suggested that this was once an area containing domestic waste, although the low numbers of macrofossils and the limited quantities of other waste imply that this was not a high density waste context. If so, waste may not have been dumped frequently on the area or material could have been periodically cleared away from the site. Preservation conditions may simply have been too poor to provide an adequate sample.[50]

*Post-hole*: Contexts [3004] and [3007] formed a post-hole cut into and through [3003] starting at 20 cm below the top of the context. The pit was 64 cm deep and oval-shaped at the top. It appeared in [3003] as a darker patch and the fill consisted of a mid-brown, sandy clay. It contained pottery sherds, a quartzite pounder, a large mammal rib, mammal long-bones and a scapula, a donkey tooth, fish bones, a sedge seed and a flax seed. The sedge seed suggests the presence of wetland vegetation but because of the small sample, it is difficult to draw conclusions regarding the use of reeds in buildings or the cultivation of flax.[51] The rubbish may have fallen into the pit from above rather than be related to the contexts below.

*Summary*: The closed jar types, the impressed decoration on the pottery and the presence of the burnt 'bricks' are diagnostic of Buto Stratum II, and the material from Sais is very similar in every respect.[52] The small range of pottery types from Sais includes open bowls, closed jars and large trays, representing the very basic Buto–Maadi types. The lithics represent the blade tool and microblade industry and, while a small sample, can be compared to that from Buto Stratum I/II and Maadi.

*Non-settled phase [3005]–[3006]*

Both [3005] and [3006] were relatively unproductive lenses of alluvial sediment consisting of a yellow or grey sandy silt with a few preserved brown organic remains, overlying layer [3008] containing human cultural material. The large amounts of silty sediment in the mud suggested that this was sediment deposited by flood action and that the earlier phases of the site had been flooded for a time, before the area was resettled in the Buto–Maadi Period.[53] Mineralised roots from wet-sieved samples from [3005] suggest that plants once grew here but did not thrive in the prevailing semi-arid conditions. Charred or waterlogged plant

[49] K. Schmidt, 'Tell el-Farain/Buto and el-Tell el-Iswid (South): The Lithic Industries from the Chalcolithic to the Early Old Kingdom', in van den Brink (ed.), *The Nile Delta in Transition*, 32.

[50] J. Cotton, *Plant Macrofossil Assessment, Sais 2002*, (unpublished report for the EES, Archaeological Services University of Durham, 2002), 4.22, table 7.

[51] Cotton, *Plant Macrofossil Assessment*, 4.23, table 8.

[52] See the diagnostic table of von der Way, *Untersuchungen*, 19 Abb. 5.

[53] See page 101 for detailed discussion.

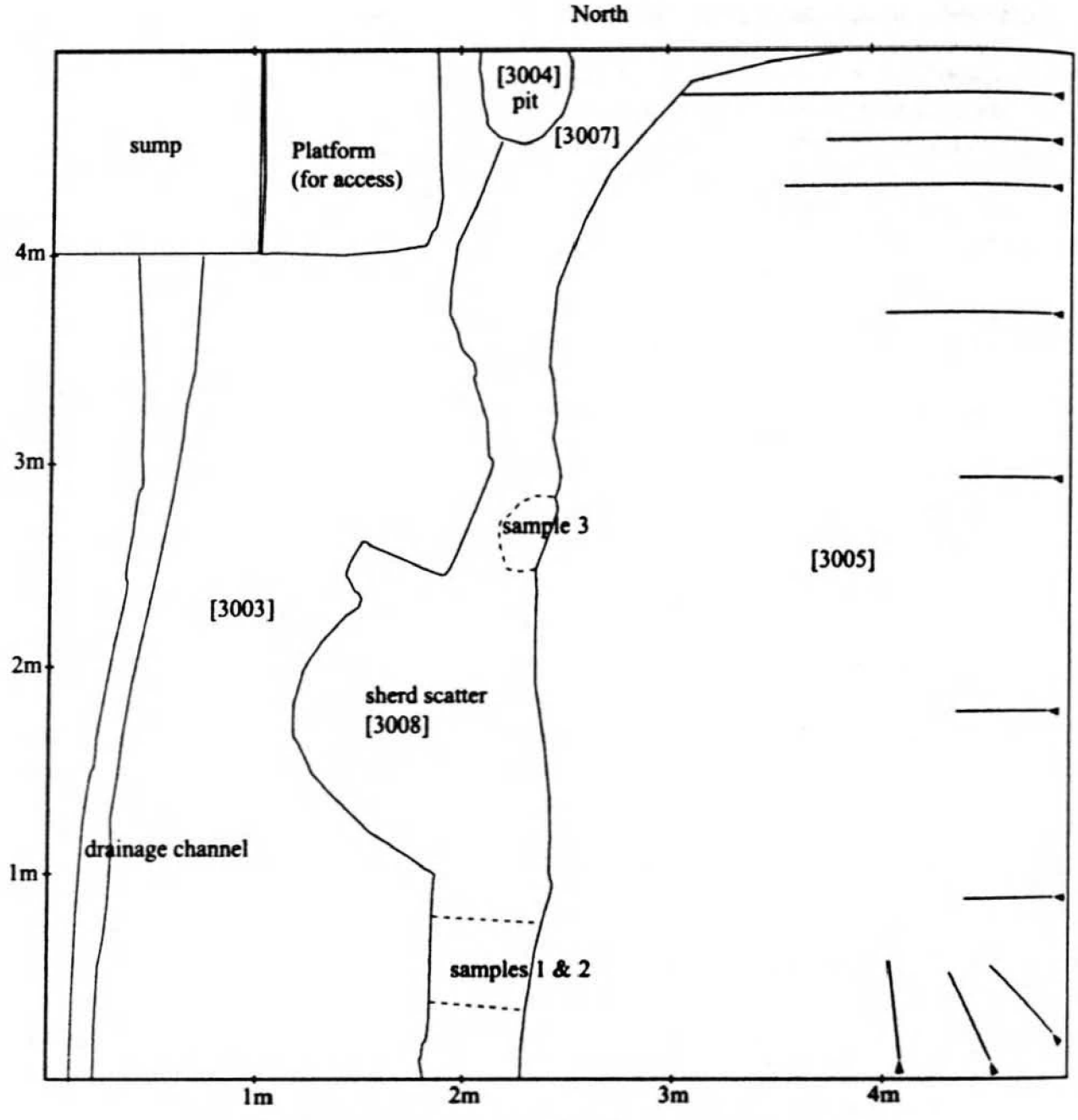



FIG. 7. Excavation 3, Phase Sais II, Middle to Late Neolithic Period.

macrofossils were not found in the environmental sample, and the aerobic conditions of the enviroment may have led to the degradation of organic matter. Context [3006] did contain a small quantity of burnt bone, but the size of the sample meant that its origin could not be identified.[54]

*Phase Sais II, Later Neolithic [3008]–[3014]* (figs. 7–8)

Context [3008] consisted of a distinctive layer 10–15 cm thick, with a lens of concentrated material running north to south at the western side of the trench. The edge of the scatter may align with the post-hole to the north, [3004] and [3007], perhaps suggesting the edge of some sort of structure. As this pit seems to descend from the upper Phase Sais III, it may simply be a coincidental alignment. More likely context [3008] was a mass of occupational debris from the side of a structure, pushed together to clear its central area; it may even have been the top of a pile of domestic waste. The layer ran under the sandy-loam mound of the

[54] Cotton, *Plant Macrofossil Assessment*, 4.24–5 and table 8.

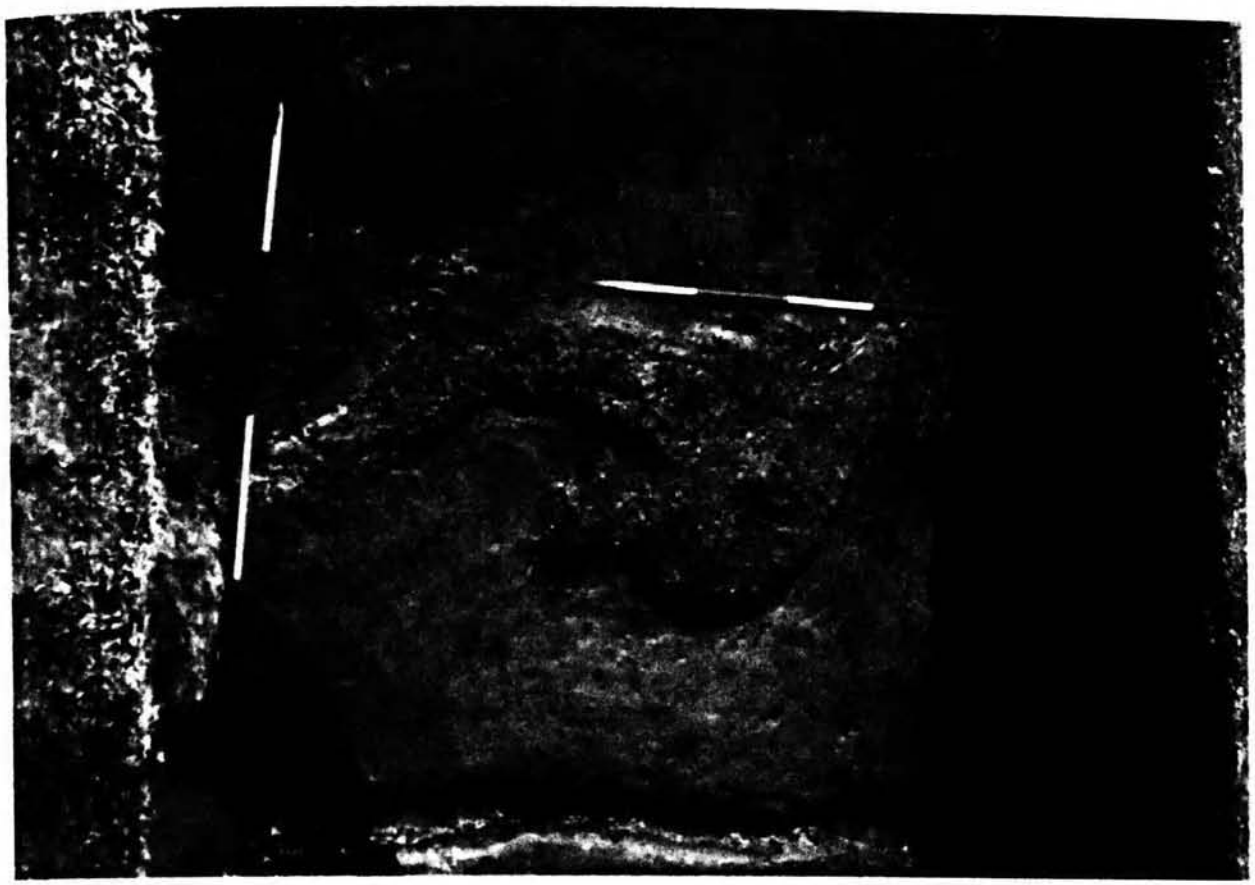


FIG. 8. Compacted pottery and bone layer [3008].

previous non-settled phase [3006] and into the eastern side of the trench. The thick concentration of material forming [3008] was clearly lying on top of [3015], an Early Neolithic context, suggesting that there was a period of abandonment of human activity in the area, but that it was brought back into use later. Fine pottery fragments predominated in the environmental analysis of the samples from this layer, although only a few were collected from the excavation. Despite the large size of the environmental samples collected, no waterlogged plant macrofossils were preserved in them, making it difficult to interpret context [3008] as evidence of an *in situ* settlement.[55]

Three possible small pits were identified in Phase Sais II: [3009] and fill [3010]; [3011] and fill [3012]; and [3013] and fill [3014]. It was not possible to determine whether they were small post-holes, tree root-holes, pot emplacements or small depressions which had filled up with darker coloured debris or organic material. One of the samples from [3013] contained charcoal, fish bone and pottery fragments, suggesting that it was domestic waste, but it was more likely to be from the top of context [3016], which has very similar constituents. Charred grains of emmer-wheat glumes with a few examples of barley and wheat and fragments of tamarix-wood (*Tamarix* spp) charcoal suggested that this was waste from fuel burning. Some mallow (*Malva*) seeds were also identified, suggesting a mixture of wild and domestic plants, or possibly disturbance of the local flora.[56]

*Pottery*: [3008] produced the largest number of sherds and had the greatest relative sherd density of all of the contexts.[57] In addition, the small splinters of pottery fragments from the wet-sieving of the sediments of [3008] suggested that the material had been exposed to erosion

[55] Cotton, *Plant Macrofossil Assessment*, 4.25, table 9.
[56] Cotton, *Plant Macrofossil Assessment*, 4.27, table 9.
[57] Sherd density was calculated by dividing the number of sherds by an estimate of the volume of the context. Thus, for the three main contexts: [3003] 1754/10 m² = 174; [3008] 1578/2.5 m² = 631; and [3015] 887/2.5 m² = 354.

or disturbance of some kind which had caused the pottery to degrade into small fragments. Many of the vessels seem to have been open bowls (for example, [3008].2–10), perhaps originally with external and internal polish. Most of the polish was lost from the pottery surfaces due to salt action and water erosion, but often a small patch was visible with a hand-lens, indicating that the whole sherd and vessel had once been burnished. Some few sherds did retain their polish and were a variety of colours, including red, brown and black. There were a few closed vessel sherds (for example, [3008].11–14), which had also been polished on the outside and were usually red in colour. The vessels were most likely ovoid vessels with a high exterior polish. There were a number of small fine-ware sherds, from open-form cups or smaller closed containers ([3008].15–16) as well as a few rims from bread trays and perhaps one crucible rim, [3008].1, a thick-walled, open vessel with burnt patches on the outside. The repertoire of pottery vessel types is similar to those from Merimde Level II onwards, but without anything very distinctive to relate it exactly to any one stratum. The polished bowl types and thick-walled closed vessels from Sais are perhaps closer to the El Omari bowl types VII–X and closed forms III–V.[58] Untempered ware vessels predominate at Sais, whereas there is a distinct change to straw-tempered ware at Merimde from Level II onward. At Sais this may indicate that the Phase Sais II layer is temporally closer to, and perhaps evolved from, Phase Sais I (see pp. 93–5). The overall absence of decoration and lack of variety of forms found at Sais is also similar to the later phases at Merimde and to those at El Omari.

*Objects*: No identifiable objects were found in context [3008], though there were numerous[59] fragments of red, yellow and brown quartzite, some black and white quartzite pieces, a few white and grey pebbles and some flint pebbles. As in Phase Sais III, they could have been the debris from stone working or may have been used both as striking stones and for burnishing.

*Lithics*: Three diagnostic lithic fragments were found in [3008]. L.58 was a piece of a bifacial sickle blade with one denticulated edge and sickle-sheen on both sides. It seemed to have been burnt and the stone was very brittle and perhaps poorly worked, so that it was difficult to see the flake scars. The distinctive bifacial flint is perhaps similar to the flint technology from the Merimde Level II to V, dating to the Middle to Later Neolithic Period and to the Upper Egyptian bifacial tradition. The sickle blade would have fitted into a wooden haft, with this example being either the squared-off end of one of the terminal pieces of the sickle blade or part of the central rectangular sickle stone.[60] It is an important indicator of the date of this layer and of grain culture at this time and perhaps in the area. There was also a scraper with retouch on the flake (L.57) and a microblade fragment (L.58).

*Fauna*: The animal bones from this context were extremely well preserved but very mineralised. A large bovid scapula (fig. 9) and skull along with several other bones and teeth, as well as pig jaws and leg bones from mature adults and juvenile animals, suggest that there was considerable animal husbandry at Sais at this period. Some of the mammal bones were burnt, suggesting that they had been cooked or processed in some way at the site. There were also fish bones in the sample, including catfish bones from fish probably caught nearby. Although there was only one identifiable sheep or goat bone in this context, there may have been other fragments among the splinters of bone found here. Some small mammal and fish bones were also retrieved from wet-sieving the environmental samples.

*Summary*: Context [3008] is distinctive because of the density of the material in the layer and the possible occurrence of pits or post-holes. This may imply that [3008] represents

[58] F. Debono and B. Mortensen, *El Omari* (Mainz, 1990), 37.

[59] The weight of stone fragments recovered was 781 g

[60] As shown in Eiwanger, *Merimde* III, 55 fig. 15.

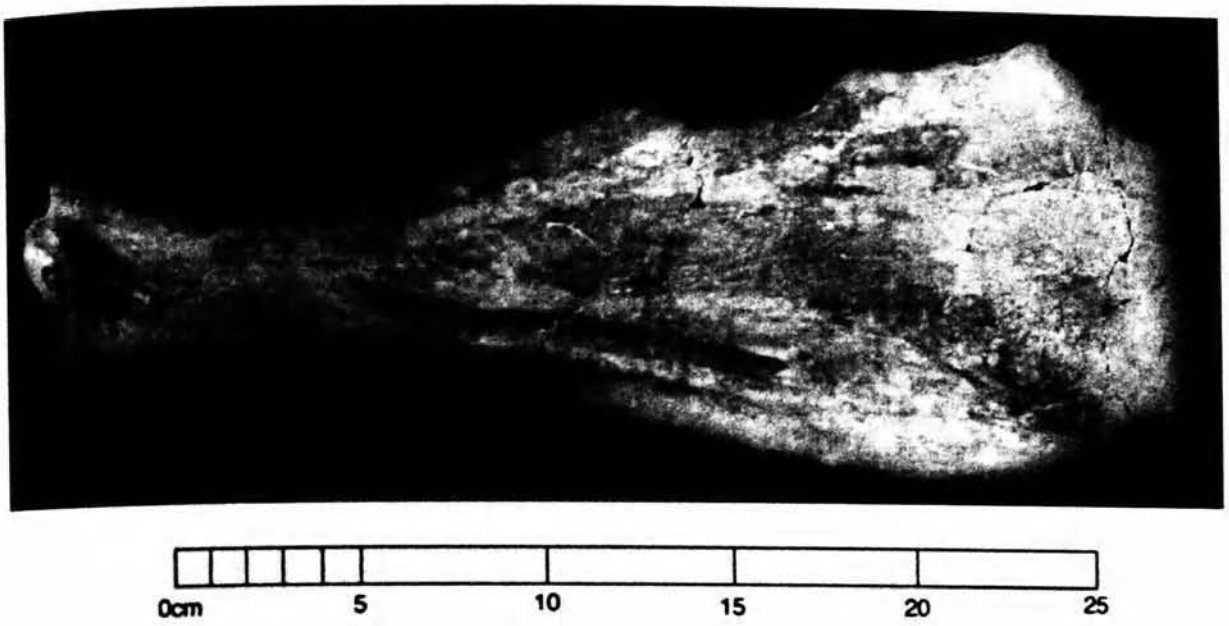



FIG. 9. Bovid scapula from [3008].

some kind of settlement layer, although the lack of grain from the sediment samples mitigates against this interpretation. Alternatively the layer may represent a stratum which was originally much thicker and was left exposed to the effects of sun and wind and consequently eroded, compressing the material into a dense band with no clearly discernible archaeological layers. Any organic material would have degraded and decayed, perhaps leaving colourations in the sediment not visible in the water-logged conditions of the excavation. Context [3008] may represent the deflated remains of a once thicker settlement layer, the inhabitants of which cultivated grain and kept cattle, pigs and sheep or goats during the Middle–Later Neolithic Period. They also lived off the abundant riverine fauna. Their houses may have been constructed of wattle fences and mud, of which nothing except the pits or post-holes [3009]–[3014] survived following the site's abandonment.

*Phase Sais I, Early Neolithic [3015]–[3016]* (fig. 10)
Context [3015] comprised silty-sandy mud, containing bone and pottery lying directly above [3016], a brown-black organic layer. Context [3016] was the lower limit of the excavation due to the encroachment of ground water, and only a small portion of it was excavated. It is likely that [3016] extended laterally over the whole of the eastern two-thirds of the trench. The ceramic and bone material in it was compacted and dense, resembling what is expected in an undisturbed settlement context. The thickness of this layer was considerable, as far as could be determined from a small test pit, which showed that it was at least 13 cm deep. Phase Sais I continued downwards with 20 cm of black carbonised material, 14 cm of light sand, a black band and a layer of light-coloured sand. The environmental sample from context [3016] contained very fine-grained material with only a small number of fish bones left after wet-sieving but no charcoal fragments or seeds were obtained from the samples. Some charred material would be expected if this had been a domestic area with waste, unless the preservation conditions do not make their survival possible. Further material from Excavation 8 may resolve the issue.

*Pottery*: The preponderence of untempered wares amongst the pottery from Phase Sais I, contexts [3015]–[3016] relative to that in Phase Sais II, contexts [3008]–[3014], suggests that the two phases are culturally distinct (pp. 96–8). There was one diagnostic pottery sherd from [3016] incised with a fish-bone motif. Parallels to this decorative motif were found in

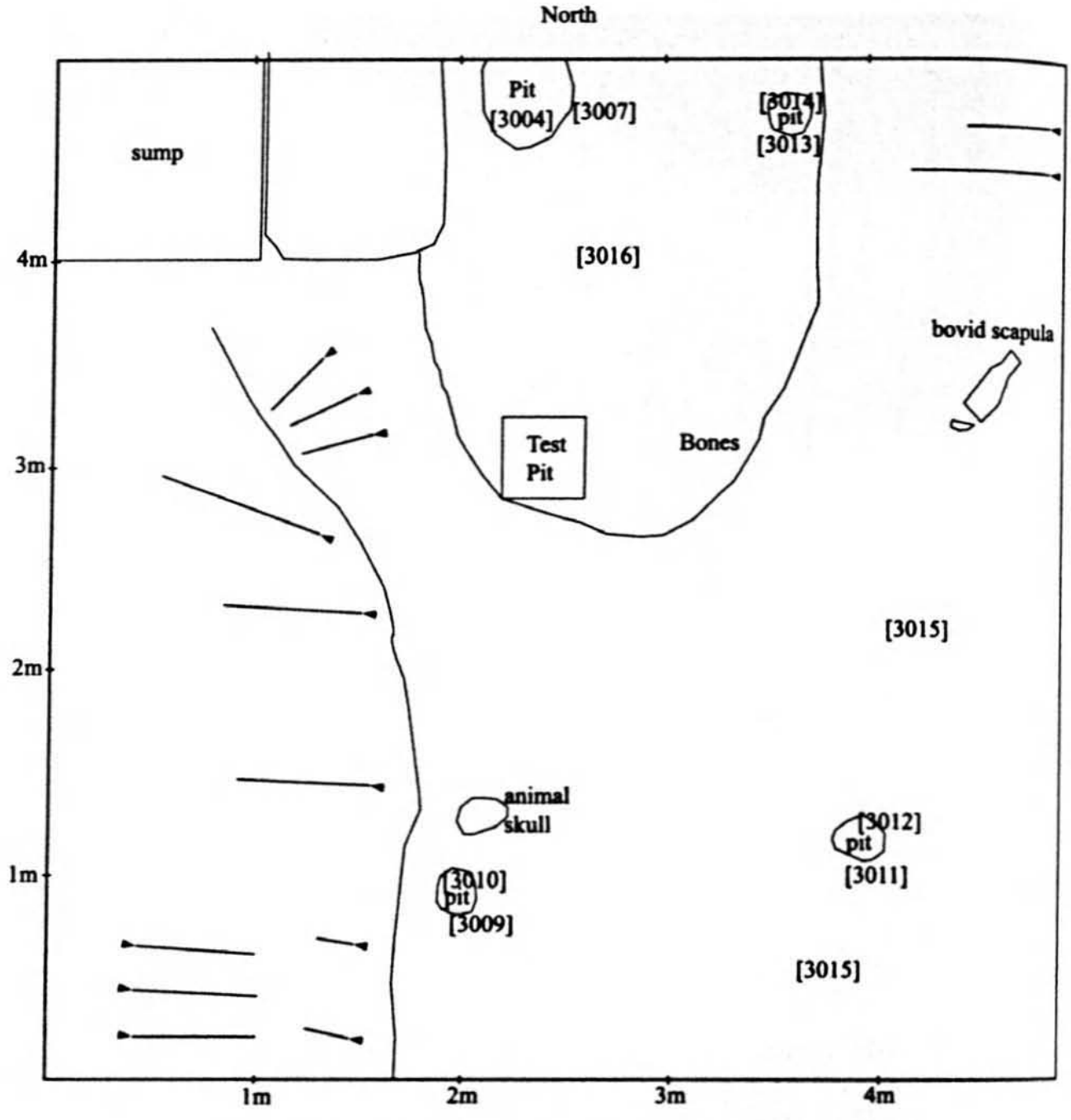



FIG. 10. Excavation 3, Phase Sais I, Early Neolithic Period.

the earliest levels at Merimde Level I.[61] One of the distinguishing factors between Merimde Levels I and II was that monochrome grey polished wares were not attested until Level II.[62] The sherds of red and grey polished wares found in [3015]–[3016] at Sais can be identified as bichrome or multi-coloured ware and, along with the sherd with fish-bone decoration, suggest that Phase Sais I is similar to the Early Neolithic Merimde Level I material.

Most of the pottery sherds are from bowls ([3015].3–7 and [3016].1–5), with some large vessels represented ([3015].1–2) and some smaller, finer bowls amongst the material ([3015].8 and [3016].6). Sherd [3015].9 seems to have come from a small bowl with straight sides and a carinated (keel) shoulder. The upper part was decorated with concentric circles applied by hand to the rim. A direct parallel to this sherd cannot be found at Merimde, but the general form of flat-bottomed basin or bowl is attested there,[63] as well as an example of

[61] J. Eiwanger, *Merimde–Benisalâme*, I. *Die Funde der Ursicht* (Mainz, 1984), nos. 1.330–421, pls. 18–21 and summary Eiwanger, *Merimde* III, 40 fig. 9.

[62] J. Eiwanger, *Merimde–Benisalâme*, II. *Die Funde der mittleren Merimdekultur* (Mainz, 1988), 15–17.

[63] For example, Eiwanger, *Merimde* I, 1.427–31, pl. 21.

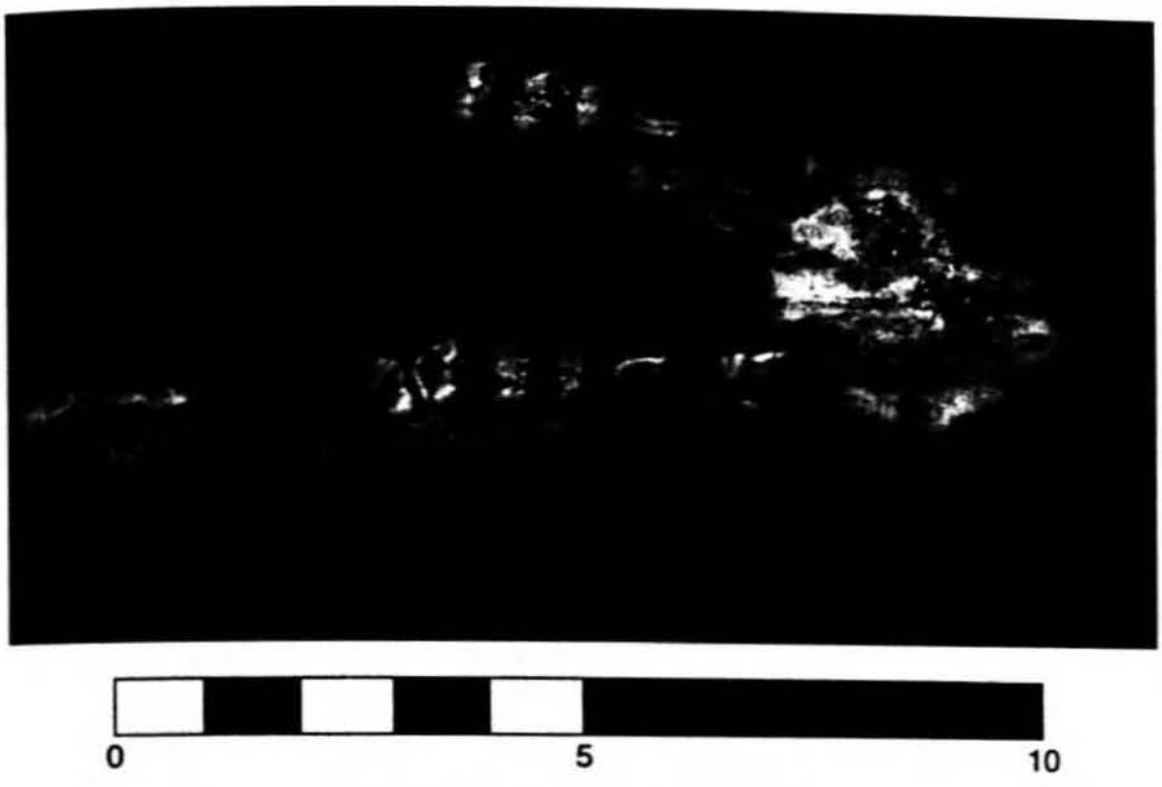



FIG. 11. Jawbone of a pig from [3015].

a sharper carination of the shoulder of a jar.[64] The decoration seemed to be the result of a deliberate application of clay, rather than having been caused by the differential weathering of horizontally burnished pottery, producing the effect of incised horizontal lines. There is also one large sherd perhaps from a large storage jar with a closed mouth, [3015].10.

*Objects*: No objects were identified in Phase Sais I, but there were small chips and fragments of red, yellow and brown quartzite in both contexts, totalling 337 g in [3015] and 161 g in [3016]. The latter also contained chips of white quartz.

*Fauna*: The assemblage of bones from [3015] included pig bones from juveniles and mature animals (fig. 11) in addition to cattle bones. Only one sheep or goat bone could be identified, though there may have been others amongst the smaller fragments, suggesting that the pig was the preferred domesticated animal, reared perhaps for a fast return on meat, fat and hide products in the Delta marsh environment. The presence of large numbers of pig bones at all levels and the possibility that the herds consisted of mature females with their litters of young and only one or two boars suggest that pig husbandry was well adapted to and practised in the conditions of the Delta, in contrast to the situation in the south-western Fayum sites.[65] Some of the pottery may have been used for the rendering of animal fat in large flat-bottomed containers which could be placed in hearths and left to boil.[66]

Fish bones from *Synodontis*-fish were found in the context and were the only material to come from the wet-sieving of a sample of the [3015] and [3016] matrices. The bones were

[64] For example, Eiwanger, *Merimde* I, 1.607, pl. 34.

[65] R. Wenke and M. Casini, 'The Epipaleolithic-Neolithic Transition in Egypt's Fayum Depression', in L. Krzyżaniak and M. Kobusiewicz (eds), *Late Prehistory of the Nile Basin and the Sahara* (Studies in African Archaeology 2; Poznan, 1989), 152.

[66] There is little evidence from pharaonic Egypt for fat rendering: M. Serpico and R. White, 'Oil, Fat and Wax', in P. Nicholson and I. M. Shaw (eds), *Ancient Egyptian Materials and Technology* (Cambridge, 2000), 390–429. Testing for traces of lard or tallow on pottery may enable the functions of the vessels from settlement sites to be better understood. The identification of uses of jars for milk/cheese, beer and bread has been achieved so far by the position of vessels in tombs or representational evidence; see S. Hendrickx et al., 'Milk, Beer and Bread Technology during the Early Dynastic Period', *MDAIK* 58 (2002), 277–304.

FIG. 12. Human male pelvis bone from [3015].

blackened, suggesting that the fish or their bones had been burnt. This may have been done when the fish were cooked over an open fire for eating immediately, but it is more likely that large catches of fish could have been prepared for storage, either by drying, salting or even smoke-drying whole fish over fires.[67] It is also possible that the flesh of the fish was removed as fillets and the bones used to stoke the fires which in turn dried the meat or boiled the fish down to a paste.

The bone material also included a single bone from a species of antelope and a fragment of a male human pelvis with pathology showing inflammation near the thigh-bone socket (fig. 12).[68]

*Summary*: The diagnostic sherd with fish-bone motif suggests that Phase Sais I is contemporary with Merimde Level I, Early Neolithic Phase. It is not clear from the excavated area at Sais whether the material is from a settlement or midden or was redeposited by river action. The presence of the human bone in [3015] suggests that the context is a rubbish layer with mixed debris redeposited from elsewhere. Alternatively, if settlements moved from their original position and occupied previous burial areas, as at Merimde, then human remains may sometimes be found in settlement debris. There was no visible evidence for buildings in this context or of stratified sequences, but the water-logged conditions meant that it was not possible to gather this kind of information. Further excavations would be required over a greater area.

[67] W. van Neer, E. Paulissen and P. M. Vermeersch, 'Chronology, Subsistence and Environment at the Late Palaeolithic Fishing Sites of Makhadma 2 and 4', in P. M. Vermeersch (ed.), *Palaeolithic Living Sites in Upper and Middle Egypt* (Egyptian Prehistory Monographs 2; Leuven, 2000), 281–6; W. Van Neer, 'Fishing along the Prehistoric Nile', in Krzyżaniak and Kobusiewicz (eds), *Late Prehistory of the Nile Basin*, 49–56; cf. comments of S. Ikram, 'Meat Processing', in Nicholson and Shaw (eds), *Ancient Egyptian Materials and Technology*, 659–68.

[68] I am grateful to Sonia Zakrewski for this identification.

*Conclusions about the Prehistoric material*

The evidence suggests that there are three clear phases of Prehistoric, anthropogenic material in the 'Great Pit' area at Sais. Analysis of the pottery ware types further suggests a clear division between the lower strata [3015]–[3008] and the upper strata [3003]–[3002]. The wares could be divided into four basic fabrics, together with a broader category of 'marl wares':

| | | |
|---|---|---|
| Ware 1: straw-tempered Nile silt | Nile B2–C | |
| Ware 2: untempered Nile silt | Nile A–B1 | fine to coarse sand, occasional straw, perhaps from manure[69] |
| Ware 3: coarse straw-tempered | Nile silt (bread tray) | Nile C |
| Ware 4: coarse straw- and stone-tempered Nile silt | | |
| Marl | | |

The pottery itself was sorted into wares and then separated into diagnostic and non-diagnostic types.[70] The Phase Sais III sherds from the Buto-Maadi Period pottery contain a higher percentage of straw-tempered sherds (ware 1) than untempered sherds (ware 2) (see table 1). There was a surprisingly small number of coarse straw-tempered sherds (ware 4), though the pottery tended to be from forms such as large bread trays or bricks rather than vessels. The marl sherds were intrusive and the upper parts of the layers could also include a few intrusive straw-tempered sherds, but the eroded nature of the pottery made it impossible to detect all the Late Period sherds. [3004] is the fill of the pit which descends into the lower layers, hence the higher proportion of untempered wares. The 'transition' layers [3005]–[3006] may also contain material from layers below, with their much higher percentage of untempered sherds. Noteworthy in [3006] are the heavier coarse bread tray fragments, representing the highest percentage of these in any of the contexts. Context [3008] (see table 2) reflects the higher percentage of untempered wares, coming from a good-sized sample, in Phase Sais II. The material from the features also reflects this trend, but with much smaller samples. Both Phase I contexts [3015] and [3016] (table 3) reflect the higher percentage of untempered pottery and the percentages of coarse straw-tempered pottery are similar to all the earlier phases.

The ware types overall show the shift from untempered ware to straw-tempered ware between the Neolithic material and the Buto-Maadi Period pottery. The untempered material can contain fine pieces of straw, which may have been included accidentally by exposure of the clay to very fine chaff from winnowing or come from the addition of manure to the clay mixture to improve elasticity and malleability. Coarse straw was used for larger vessels and bread trays throughout the Neolithic and Predynastic Periods, perhaps suggesting that the manufacture of larger objects with coarse straw is related to the use of mud as a building material, particularly for mud plaster on reed walls of structures.

The pottery analysis confirms, in a very crude manner, that there are three distinct phases of human occupation at the site and that the earlier two phases Sais I–II are related, while the Sais III phase is distinct in pottery wares and forms and in lithic technology. The apparent temporal and technical hiatus between the Neolithic and Buto-Maadi Period strata

[69] I. Rizkana and J. Seeher, *Maadi*, 1. *The Pottery of the Predynastic Settlement* (Mainz, 1987), 24–5.

[70] The pottery typologies have not been harmonised for Prehistoric Lower Egypt, so the basic forms developed by Renée Friedman and then employed by Barbara Adams were used as a guide: Adams, *Excavations in the Locality 6 Cemetery*, 7–17. Separate form lists have been published by C. Köhler, *Tell el-Fara'in–Buto*, III (Mainz, 1998), 86–90; Rizkana and Seeher, *Maadi* I, 33; and summaries by Eiwanger, *Merimde* III, 41, fig. 11 and Debono and Mortensen, *El Omari*, 37.

raises further questions about the changing environment and the context in which people lived in this particular location from the Neolithic Period through to the Buto–Maadi Period.

TABLE 1. *Percentages of wares by context for Phase Sais III [3002]–[3007], Buto-Maadi Period*

| *Context* | *[3002]* | *[3003]* | *[3004]* | *[3006]* |
|---|---|---|---|---|
| *Ware 1* | 77.2% | 80.5% | 11.5% | 27% |
| *Ware 2* | 15% | 13.4% | 88.4% | 68% |
| *Ware 3* | 5.2% | 2.9% | 0.1% | 5% |
| *Ware 4* | 2% | 3.1% | – | – |
| *Marl* | 0.6% | 0.1% | – | – |
| *Total sherds* | 813 | 1754 | 104 | 304 |

TABLE 2. *Percentages of wares by context for Phase Sais II [3005], [3008]–[3014], Middle to Later Neolithic*

| *Context* | *[3008]* | *[3010]* | *[3012]* | *[3014]* |
|---|---|---|---|---|
| *Ware 1* | 10.7% | – | – | 37.5% |
| *Ware 2* | 85.1% | 100% | 83.3% | 62.5% |
| *Ware 3* | 3.9% | – | – | – |
| *Ware 4* | 0.3% | – | 16.7% | – |
| *Total sherds* | 1578 | 8 | 6 | 8 |

TABLE 3. *Percentages of wares by context for Phase Sais I [3015]–[3016], Early Neolithic*

| *Context* | *[3015]* | *[3016]* |
|---|---|---|
| *Ware 1* | 10.9% | 7.4% |
| *Ware 2* | 83% | 86.2% |
| *Ware 3* | 5.1% | 2.4% |
| *Ware 4* | 1% | 4% |
| *Total sherds* | 887 | 207 |

## Chronology and relative dating of the Sais Prehistoric material

The Neolithic archaeological material from the Prehistoric excavations at Sais has its closest parallels in that of the Merimde Neolithic culture. The site at Merimde Beni Salama is estimated to have existed from around 4,800 to 4,400 BC[71] (and perhaps later) and was a desert edge settlement with small communities who hunted and fished, and grew and processed crops, similar to the small agricultural economies of the Fayum. The main indicator of a contemporaneous date of the Sais material to that at Merimde is the presence of the fishbone-incised decorated ware which would make Phase Sais I contemporary with Merimde Level I.[72] The principal excavator at Merimde, Josef Eiwanger, suggested that Merimde Level I (or *Ur Level*) dated to the sixth millennium BC, partly on account of comparable material from Levantine Neolithic sites. The herringbone decoration is also found on Yarmukian pottery from sites such as Munhata in Palestine (fifth millennium BC onwards),[73] the Neolithic B level at Jericho,[74] or levels I–IV

[71] F. Hassan, 'Radiocarbon Chronology of Neolithic and Predynastic Sites in Upper Egypt and the Delta', *The African Archaeological Review* 3 (1985), 104–5; most recently discussed by S. Hendrickx, 'La chronologie de la préhistoire tardive et des débuts de l'histoire de l'Egypte', *Archéo-Nil* 9 (1999), 13–81.

[72] Further examples have been recovered from Excavation 8 in March–April 2005: Wilson, *JEA* 91, 4–8.

[73] An example from Munhata is discussed by O. Bar-Yosef, 'The Neolithic Period', in A. Ben-Tor (ed.), *The Archaeology of Ancient Israel* (Open University of Israel, 1992), 36, fig. 2.12.

[74] H. Larsen, 'Vierzierte Tongefaß-Scherben aus Merimde-Benisalâme in der ägyptischen Abteilung des Mittelmeermuseums in Stockholm', *Orientalia* 7 (1959), 3–23.

at Hassuna (sixth millennium BC).[75] The pottery shows the herringbone design in horizontal bands around the necks of vessels or in chevron bands on the shoulder and body of the vessels. The design is impressed with a broad tool, but the vessels do not seem to have been burnished. Examples of this type of decoration have also been reported from the Sodmein cave in the Eastern Desert, dated to the early sixth millennium BC.[76] The dating of the Merimde material to the sixth millennium BC means that the Sais pottery would be of the same date. There are also implications for the date of the arrival in Egypt of Levantine domesticates and the cultural influences on Fayumic Neolithic culture and Merimde in the sixth millennium, due to the dispersal of farming technology.[77] Midant-Reynes considers that Merimde Level I belongs in the hiatus between the Helwan Epipalaeolithic and Fayum A cultures in the sixth millennium,[78] again suggesting that the Early Neolithic Sais I should be dated to the sixth millennium and making it, with Merimde Level I, a bridging culture.

Absolute dates for cultural levels at Prehistoric sites in Northern Egypt, including Merimde, Buto, El Omari, Maadi and Minshat Abu Omar, have been supplied from radiocarbon samples at both Merimde and Buto, but they have not always proved to be consistent with the relative dates of the different strata at the sites (table 4). Hassan collected and published radiocarbon dates from the Prehistoric Period up to 1985, and his average of 4,800–4,400 BC[79] for Merimde Level I and V is considerably later than Eiwanger's original estimate of the sixth millennium BC for Merimde Level I based on the pottery.[80] Eiwanger considered the radiocarbon dates to be too recent but such discrepancies between the possible relative dates and absolute dates for the Merimde *Ursicht* levels are not unusual in Egypt.[81] When recalculated according to latest calibration curves, the range is from 4,715–4,390 BC.[82] It should also be noted that only a small number of samples from Merimde have been tested and clearly with a larger dataset more certainty over the radiocarbon dates would be possible.

The subsequent Buto dates are also problematic for the Buto–Maadi phases as a whole (table 4). Von der Way submitted a number of samples for testing, but after calibration the results were so variable and inconsistent, he concluded that they were unreliable as markers of fixed (absolute) chronological dates.[83] The ground conditions, contaminants and long period of burial may have affected the final results.[84] This holds true for Sais, for in the 'Great Pit' area the soil is waterlogged with waste household washing water and water which has leached down from the surrounding irrigated fields, containing alkaline salts.[85] The bones from Excavation 3 were heavily mineralised, almost to the point of being fossilised, suggesting that the chemical process affecting them had happened in the intervening time between deposition and discovery. Such bones provide little or no collagen for radiocarbon

[75] Cited by H. Larsen, 'Die Merimdekeramik im Mittelmeermuseum Stockholms', *Orientalia Suecana* 11 (1962), 4–89, Jericho comparanda 69–70.

[76] Hendrickx and Vermeersch, in Shaw (ed.), *Oxford History of Ancient Egypt*, 36.

[77] For a summary of the broader picture see Bellwood, *The First Farmers*, 99–103; Shirai, *Neo-Lithics* 1/05, 12–17.

[78] *Prehistory of Egypt*, 108–11.

[79] Hassan, *The African Archaeological Review* 3, 98. The calibrations in table 2 were carried out using the most recent iteration of the OxCal calibration curve (2004). I am grateful to Andrew Millard, Department of Archaeology, Durham University, for his advice and assistance.

[80] Eiwanger dated Level I to the second half of the sixth millennium BC (*c.* 5,500 BC), Level II to between 5,500 and 4,500 BC and Level V corresponding to Fayum A to *c.* 4,600 and 4,000 BC, summarised by Hendrickx, *Archéo-Nil* 9, 18–19.

[81] M. A. Geyh, P. Munro and R. Germer, 'Zur absoluten Chronologie des Alten Reiches und der 1. Zwischenzeit nach konventionellen und kalibrierten 14C-Daten', *SAK* 16 (1989), 65–81; M. F. Pazdur and D. J. Micczynska, 'Probabilistic Calibration of Radiocarbon Dates with Specific Examples from Northeastern Africa', in Krzyżaniak, Kobusiewicz and Alexander (eds), *Environmental Change*, 473–83.

[82] Using OxCal calibration curve software (2004).

[83] *Buto* I, 81–3. The bone samples were in bad condition with little carbon left in them and other materials also seemed to have suffered after such long burial. The problems with radiocarbon dating in Egypt are noted by Geyh et al., *SAK* 16, 65–81.

[84] Geyh et al., *SAK* 16, 74–7.

[85] The test results of a water sample from the 'Great Pit' for June 2002 are as follows: HCO3- 58.2%, Na+ 48.2% and Mg++ 40% are the highest concentrations of ions; the pH is 8.2 and 992 Total Dissolved Salts (ppm)—courtesy of Zeinab Lotfi Belal, *Sedimentological and Geophysical Studies on the Late Quaternary Sequence of Sa el Hagar Area Gharbiya Governorate, Nile Delta-Egypt* (unpublished MSc dissertation, Mansoura University, 2004), 44–61.

TABLE 4. *Radiocarbon dates and calibrated dates*

| *Place* | *Uncorrected date* | *Calibrated date* | *Source* |
|---|---|---|---|
| Kafr el-Zayyat 1.5 m | 1,690 +/- 80 BP | AD 130–540 | Smithsonian 86 |
| Kafr el-Zayyat 7 m | 4,910 +/- 100 BP | 4,000–3,500 BC | Smithsonian 86 |
| Kafr el-Zayyat 16.5 m | 6,430 +/- 110 BP | 5,650–5,200 BC | Smithsonian 86 |
| Merimde Schicht I | 5,830 +/- 60 BP | 4,830–4,540 BC | Eiwanger; OxCal |
| Merimde Schicht I | 5,790 +/- 60 BP | 4,780–4,500 BC | Eiwanger; OxCal |
| Merimde Schicht V | 5,590 +/- 60 BP | 4,530–4,340 BC | Eiwanger; OxCal |
| Merimde Schicht V | 5,760 +/- 60 BP | 4,730–4,460 BC | Eiwanger; OxCal |
| Merimde Schicht V | 5,440 +/- 75 BP | 4,450–4,050 BC | Eiwanger; OxCal |
| Buto I KN 4015 | 5,230 +/- 200 BP | 4,340–3,790 BC | von der Way |
| Buto I–II KN 4016 | 3,800 +/- 600 BP | 3,030–1,510 BC | von der Way |
| Buto IIb KN 4220 | 4,380 +/- 150 BP | 3,330–3,220 BC | von der Way |
| | | 3,150–2,890 BC | von der Way |
| Buto IIb KN 4446 | 4,980 +/- 400 BP | 4,240–3,350 BC | von der Way |
| Maadi R-1425 | 4,860 +/- 70 BP | 3,800–3,510 BC | Caneva; OxCal |
| Maadi R-1426 | 4,680 +/- 70 BP | 3,640–3,330 BC | Caneva; OxCal |
| Maadi R-1427 | 4,900 +/- 70 BP | 3,810–3,620 BC | Caneva; OxCal |
| Maadi R-1428 | 4,890 +/- 70 BP | 3,810–3,520 BC | Caneva; OxCal |
| El Omari 3934 | 5,500 +/- 65 BP | 4,360 +/- 120 BC | Debono, Mortensen |
| El Omari 3933 | 5,690 +/- 70 BP | 4,540 +/- 180 BC | Debono, Mortensen |
| El Omari 3994 | 4,790 +/- 60 BP | 2,840 +/- 60 BC | Debono, Mortensen |
| El Omari C-463 | 5,255 +/- 230 BP | 4,110 +/- 260 BC | Debono, Mortensen |
| Buto Area | 5,690 +/- 130 BP | 4,850–4,250 BC | Andres, Wunderlich |
| | 3,975 +/- 80 BP | 2,750–2,200 BC | Andres, Wunderlich |
| Buto, HD 9194-9071 | 4,595 +/- 55 BP | 3,520–3,260 BC | Andres, Wunderlich |
| Buto, HD 9420-9214 | 4,600 +/- 45 BP | 3,520–3,310 BC | Andres, Wunderlich |
| Buto, HD 9421-9232 | 6,135 +/- 75 BP | 4,250–3,700 BC | Andres, Wunderlich |
| Buto, HD 9422-9233 | 6,810 +/- 140 BP | 5,930–5,480 BC | Andres, Wunderlich |
| Buto, HD 9423-9253 | 5,610 +/- 45 BP | 4,530–4,350 BC | Andres, Wunderlich |
| Buto, HD 9424-9254 | 5,870 +/- 70 BP | 4,910–4,540 BC | Andres, Wunderlich |
| MAO | 4,020 +/- 70 BP | 2,900–2,300 BC | Wunderlich |
| | 5,720 +/- 80 BP | 4,730–4,360 BC | Wunderlich |

dating, as seems to have been the case with the bones tested from Buto. This illustrates the need to understand the processes at work in Egyptian conditions before the results of radiocarbon dating can be applied confidently for absolute dating in the Prehistoric Period.

Other Prehistoric Northern Egyptian sites have also provided radiocarbon dates, with the earliest levels at Maadi giving a maximum range of between 3,800 and 3,330 BC and an average of 3565 BC,[86] while those from El Omari have given a date range of 4,720 to 2,780 BC (table 4).[87] In the Fayum, Kozlowski and Ginter have identified an early phase of Early Neolithic Fayumian, with lithic artefacts similar to those of the Merimde culture from

[86] All of the dates come from charcoal samples: I. Caneva, M. Frangipane and A. Palmieri, 'Excavations at Maadi', in Krzyżaniak and Kobusiewicz (eds), *Late Prehistory of the Nile*, 289–90 (with calibrations).

[87] Dates from charcoal samples from El Omari: Debono and Mortensen, *El Omari*, 81 (with calibrations).

4,800 BC onwards and a Late Neolithic Moerian phase from 3,500 BC onwards.[88] The radiocarbon dates collected by Ginter from Qasr es-Sagha and analysed by Hassan suggest that these estimates should be earlier, with the Early Neolithic Period ranging between 5,230 +/- 50 BC and 4,455 +/- 110 BC and the Late Neolithic Period ranging between 4,275 +/- 170 BC and 4,030 +/- 95 BC (table 4).[89] The evidence for the Lower Egyptian and Fayum Neolithic cultures can be tabulated to show that the Fayumian Early Neolithic from the late sixth millennium was contemporary with the Merimde culture in its early stages and the El Omari culture, all of them apparently terminating in the very early fourth millennium (*c.* 4,000–3,900 BC).[90] The Maadi culture, then, continues the development of the Lower Egyptian culture after the Neolithic Period from *c.* 3,800–3,300 BC, with clear connections to the east through trade with the Levant. The Buto–Maadi phases at Buto from 3,500 BC then continue into the Predynastic and Early Dynastic Periods.[91]

The stratigraphical evidence from Sais can only assist us in a limited way to understand cultural developments from the Neolithic to Buto–Maadi Period. There is a layer of around 40 cm of alluvium in contexts [3005]–[3006] sealing the Neolithic material and providing the ground level for the subsequent Buto–Maadi resettlement, around 3,500 BC. If the rate of sedimentation were limited to the average suggested by Butzer, that is, 1.45 mm each year,[92] the layer between the Neolithic and Buto–Maadi phase would have taken 275 years to accumulate. There are a number of variables which may affect this figure. The rate of flooding and volume of sediment deposited in this location may have varied from year to year, from neglible for a period of time to a heavy deposit of sediment over a short time. In addition, the dense Neolithic stratum [3008] has been subjected to abandonment and deflation, with the ground surface having been exposed and abraded by wind erosion and drying sun before the flooding. The length of the period of deflation of the land surface cannot be estimated, however, so that the length of time between the last Neolithic material at Sais and that of the Buto–Maadi Period can only be said to be at least 300 years, but possibly as much as 1,000 years or more.

There is an apparent coincidence between the transition from Neolithic to Predynastic culture in Lower Egypt in the first half of the fourth millennium, the switch from an emphasis in human activity in the Delta from the western to the eastern side and the hiatus in the archaeological record at Sais apparently covering precisely this time. It is likely from the archaeological evidence that after the Sais II Neolithic stratum there was abandonment of this area, deflation of the sand levee and flooding for around 300 years before the area was reinhabited by 3,500 BC. This suggests that in the first half of the fourth millennium there was a period of aridity, perhaps causing low floods, and then a resumption of regular inundations. Hassan also notes that the main stimulus to agricultural developments in Egypt may have been a period of severe aridity after *c.* 6,700 BP (that is *c.* 4,750 BC).[93] Environmental conditions may have caused movement of people from the desert towards the Nile, and therefore possibly the Delta, for a period lasting around 500 years. The small amount of environmental evidence from Minshat Abu Omar also seems to suggest that there was a hiatus in occupation of this site in the eastern Delta between the end of its Neolithic phase and the Predynastic sequences. As a result of the work at Sais and other Lower

[88] J. K. Kozlowski and B. Ginter, 'The Fayum Neolithic in the Light of New Discoveries', in Krzyżaniak and Kobusiewicz (eds), *Late Prehistory of the Nile Basin*, 157–79.

[89] Hassan, *The African Archaeological Review* 3, 105–6.

[90] Noticed by B. Mortensen, 'Carbon-14 Dates from El Omari', in R. Friedman and B. Adams (eds), *The Followers of Horus. Studies Dedicated to Michael Allen Hoffman* (Oxbow Monograph Series 20; Oxford, 1992), 173–4.

[91] For a summary see Midant-Reynes, *Prehistory of Egypt*, 264 Chart 4, although this is predicated upon Merimde culture beginning in the early sixth millennium; based upon W. Kaiser, 'Zur Sudausdehnung der vorgeschichtlichen Deltakulturen und zur frühen Entwicklung Oberägyptens', *MDAIK* 41 (1985), 61–87.

[92] See n. 9.

[93] F. Hassan, 'Toward a Model of Agricultural Developments in Predynastic Egypt', in L. Krzyżaniak and M. Kobusiewicz (eds), *Origin and Early Development of Food-Producing Cultures in North-Eastern Africa* (Studies in African Archaeology 1; Poznan, 1984), 222.

Egyptian sites, it seems that a major change in environmental conditions occurred during the Neolithic Period, perhaps with implications for communities and settlements which had been established there. For example, the settlement at Sais with its connections to the western desert edge at Merimde was abandoned and the area of the 'Great Pit' in which it had been situated was not inhabited again for at least 300 years, and probably more, by the people of the Buto–Maadi cultural group who had their links to the north at Buto and to the south at Maadi and thence eastward to Palestine.

## The local environment of the Sais Prehistoric material

In order to reconstruct the ancient environment in which people lived at Sais and to examine the effects of the local river system on the ecosystem of the region around Sais a series of transects comprising shallow drill augers and a few deep drill augers was made across the region around Sa el-Hagar, including archaeological zones such as the 'Great Pit' and Kom Rebwa to the north of Sa el-Hagar. The deeper drill cores were combined with an array of Vertical Electrical Resistivity soundings in order to enable the buried geological layers to be reconstructed in a more sensitive manner (fig. 13).[94] The aim was to relate archaeological material from the drill cores and Excavation 3 in the 'Great Pit' to the environmental data and to begin to reconstruct the palaeoenvironment of the area in order to assess the impact of the local Delta environment on the possibilities and practicalities of human settlement in the Sais region.

The layers of sediments and geological conditions underlying Excavation 3 were investigated by two drill augers. Drill auger (core) 15 was made from the ground level of Excavation 3 and core 60 was drilled in the north-eastern corner of Excavation 3 at the level where work stopped.

The results from core 15 showed the sediments beneath the archaeological material and therefore indicate the conditions at the time when settlement occurred. The upper strata of core 15 matched the phases of the contexts in Excavation 3 closely (fig. 14). The upper Late Period contexts [3000] and [3001] were distinguished by organic material and root clasts, perhaps from the presence of part of the pool in the 'Great Pit'. Context [3003] appeared as a concentration of pottery comprising around 40% of the core material. The context layer occurred slightly lower in the drill core, but this may have been due to the difference in position of the core and section, the contours of the layer and the way in which the auger itself can push material down the drill hole. The alluvial layer [3006] was not so distinct, but was a band without significant human cultural material in the core, and [3008] was a distinct concentration of anthropogenic material. The black staining lower in the core represented the dark organic layers of [3016]. Alternating bands of brown alluvium gave way to black silty clay (5Y 2.5/2) at a depth of around 5 m, and between 6.5 m and 7.28 m there was a band of heavy brown-orange staining with a gritty texture. Some pottery from above seemed to have fallen into the auger hole of core 15 and cannot be regarded as indicating an anthropogenic layer at this level without further evidence.

Core 60 began at the charcoal/carbon rich layer underneath [3015]–[3016] (fig. 14), which contained fish bones and some pottery. According to the auger data, this was 1.5 m in depth, and it was the last human cultural material reached in the core. The layer seems therefore to

[94] The deep drill work at Sais was undertaken by a team from University of Mansoura, begun by the late Prof. Mahmoud Gamili and continued by Prof. Adam el-Shahat and Dr Hosni Ghazala, with analyses of sediments and interpretations by Zeinab Lotfi Belal. I am grateful for their contribution to the work and for their assistance in interpreting the data. The geoarchaeological implications have been published in preliminary form—H. Ghazala, A. el-Shahat, R. Adel, P. Wilson and Z. Belal, 'Geoelectrical Investigations around Sa el-Hagar Archaeological Site, Gharbiya Governorate, Nile Delta, Egypt', *The Journal of Geology and Geophysics, Mansoura University* 32/1 (2005), 121–37. The shallow drill augers were undertaken from 1997 to 2005 by members of the Sais team and are published in part in Wilson, *The Survey of Sais*, 177–204. I am grateful to Daniel Lines, Mohammed Abdel Aziz, Angus Graham, Gregory Gilbert and the Mansoura team for their discussion of the data.

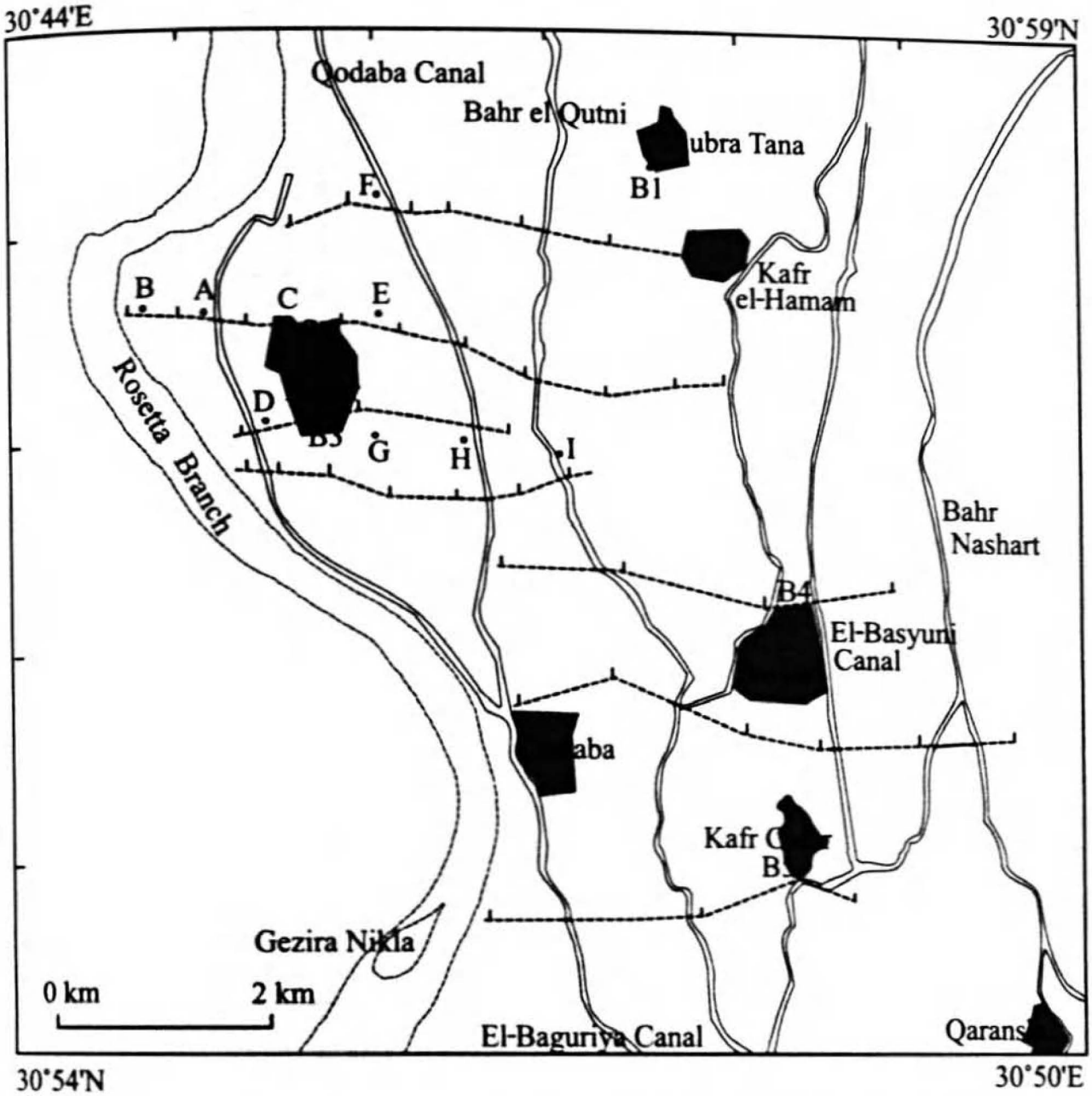



FIG. 13. Map of Vertical Electrical Sounding transects and deep drilled boreholes, made across the Sa el-Hagar area (after Lotfi Belal, *Sedimentological and Geophysical Studies*, 63, fig. 5.1).

represent the first human activity at the site, though it was a dense layer and probably comprised several distinct phases. The underlying sediment consisted of a series of grey-brown, sandy-silt bands in which the material was fine and well sorted. The sand was too fine to be the Pleistocene *gezira* sand, but was more likely to be from a sandy river levee or *gezira* sand reworked in the Holocene Period by river action. A band of iron oxide brown-orange staining seems to complement the core 15 layer and together they may reflect a period of aridity, when fluvial sands were exposed to the air and oxidised to cause the stain. Some of the staining and the sand within such layers could have been subsequently removed by wind action.[95] The arid period followed a period of marshy and lagoonal conditions which left a layer of peat some 6.5 m beneath the base of the excavation. Silt and then thick, black mud below this level suggested the presence of a deep water channel with anaerobic conditions. The channel, therefore, must have been abandoned and filled with sediment before a shallow lagoon or marsh was formed, creating the layer of peat. The end of the core, 9.15 m below the excavation, extends back into the Holocene, although it was not possible

[95] A. el-Shahat et al., *Journal of Geology and Geophysics, Mansoura University* 32/1, 79–119.

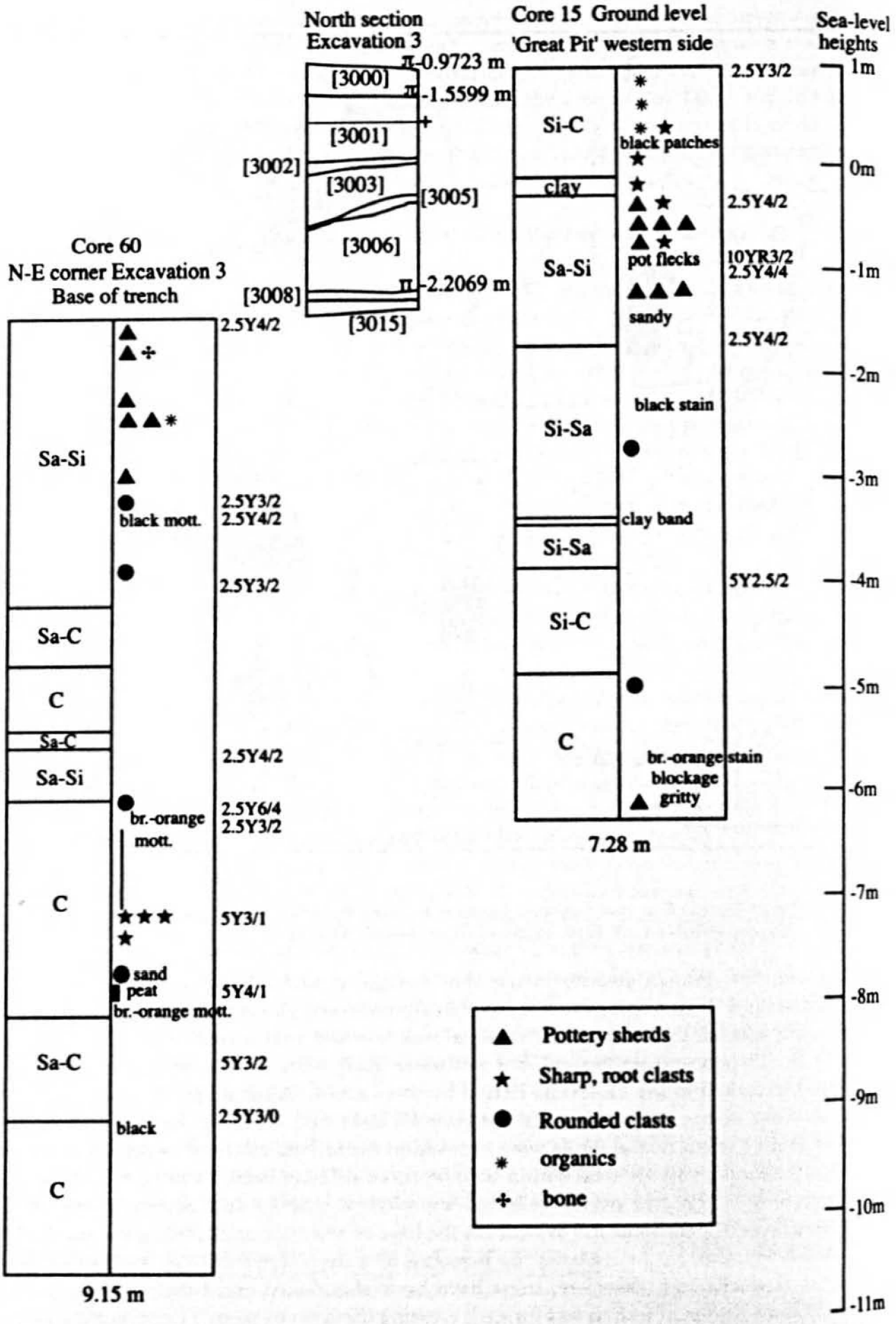



FIG. 14. Lithographic logs of drill cores 15 and 60, compared with Excavation 3 section.

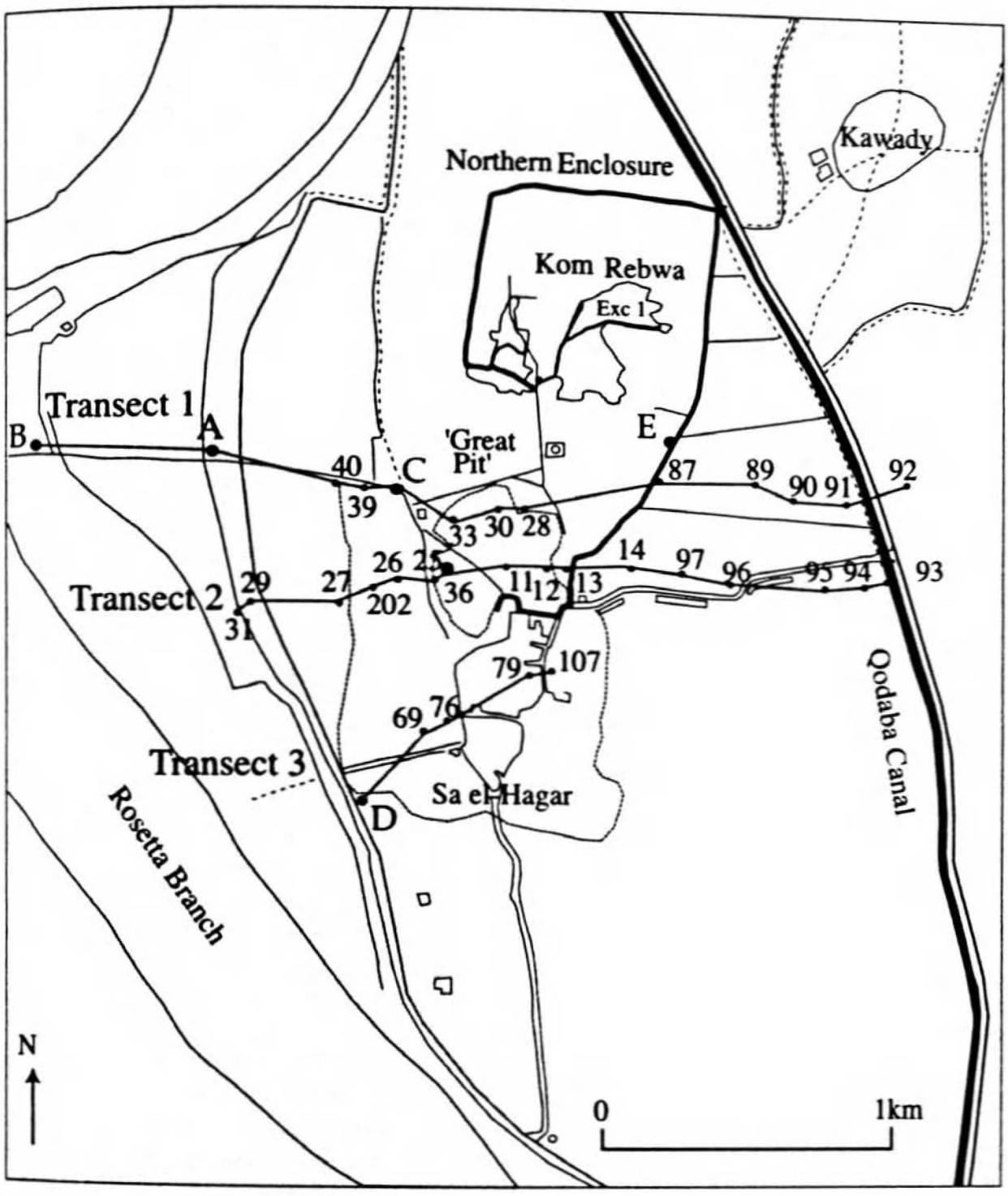



FIG. 15. Map of drill core transects 1 to 3 at Sa el-Hagar.

to estimate the date of this level based on sedimentation levels alone. The presence of a river channel, then floodplain, then marsh and finally river levee illustrates the changing local environment, perhaps due to variable sea levels and riverine systems in the area over a long period.[96] The Smithsonian Institute database of drill augers, carried out as part of a project to study sea level and coastal changes, records one auger, S.86, at Kafr el-Zayyat, about 20 km to the south of Sa el-Hagar.[97] Radiocarbon dates were obtained from a depth of 16.5 m, at what was regarded as the beginning of the Holocene levels, of 6,430 +/- 110 BP and 4,910 +/- 100 BP at 7 m in depth, calibrated to 5,650–5,200 BC and 4,000–3,500 BC respectively

[96] If an average sedimentation rate of 1.4 mm of sediment was deposited at each inundation, then the core could represent up to 6,500 years, that is, date to 10,500 BC.

[97] D. J. Stanley, J. McRea and J. C. Waldron, 'Nile Delta Drill Core and Sample Database for 1985–1994: Mediterranean Basin (MEDIBA) Program', *Smithsonian Contributions to the Marine Sciences* 36 (1996), 198–200.

(table 4). The depth of the first auger could be related to the corrected final depth of core 60, but it is not clear whether the disturbed settlement nature of the 'Great Pit' can be compared meaningfully to a possibly virgin site in Kafr el-Zayyat.

Transects[98] in the immediate area of Excavation 3 confirmed both the extent of the Prehistoric material and the possible form of the early landscape (fig. 15). The transects have been reconstructed from the following individual core lithographic logs, with the cores listed in order from west to east:

Transect 1 (fig. 16): Augers B, A, 40, 39, C, 217, 30, 28, E, 87, 88, 89, 90, 91, 92.
Transect 2 (fig. 17): Augers 31, 29, 27, 16, 203, 26, 36, 25, 11, 12, 13, 14, 97, 96, 95, 94, 93.
Transect 3 (fig. 18): Augers D, 69, 76, EBA B3, 177, 79, 107, H.

Based upon the transects and VES survey, the underlying geomorphology of the area can be reconstructed (fig. 19). There was once a fine-sand levee to the west of the 'Great Pit', covered with the alluvial silty-sand which comprises the modern agricultural layer. The layer of silt here is thin and it may be significant that the western side of the Sa el-Hagar area, and especially the area beside the modern Rosetta branch of the Nile, is now used for banana cultivation. There was an ancient and deep river branch to the west of Excavation 3, perhaps in a channel running from south-east to north-west, as shown by the blue-black mud in it. It could have been one of the deeply incised channels caused by a drop in sea level during the last glaciation around 18,000 years BP.[99] It cut through the underlying Pleistocene medium-grained sand and may either have created a deep bend in the channel to the north-west of the 'Great Pit' or continued northward somewhere in the vicinity of the modern Rosetta branch. The reworked, fine sandy-silt may have been deposited by this channel as a levee on the outside of the bend.[100] Alternatively, the ancient channel may have meandered around a previous levee or a point bar on the inside of a meander bend of another river branch to the west.[101] The course of the modern Rosetta branch may have been formed due to channel movement (avulsion) following a crevasse event: once water escapes from its channel bed (through a crevasse in the bordering levee to the west of Sais), a network of channels develops, gradually coalescing into fewer, larger channels and then finally one dominant channel. The new channel at Sais would have eroded the splay of minor channels running through the crevasse and also some of the minor channel sediment associated with earlier avulsion stages.[102]

At Prehistoric Sais the eastern side of the sandy-silt hill seems to have provided a settlement area during the Neolithic Period. With the river branch in a new channel to the west of the sand hill, the eastern slope of the hill may have been more protected from the flooding of the river channel, providing an area of dry high ground during the flood. After the inundation, water may have been held in the marshes and basins on the east side of the river, in the area of the modern 'Great Pit', creating shallow ponds where fish could be caught in the brief time after the inundation had subsided but before the pools and basins of water had dried up. A water-logged marsh may have existed in the area of the 'Great Pit'. This suggests that the earliest settlers came to the sandy high ground because of a seasonal anomaly beginning at the end of September and lasting throughout the winter months until early in the next year. *Clarias* (Nile catfish) prefers deoxygenated, shallow, swampy

[98] The transects comprise deep drill augers made by the Mansoura University team (letters A–D and H), and shallow augers made by the Sais Project and Egyptian Building Authority core B3.

[99] Andres and Wunderlich, in van den Brink (ed.), *The Nile Delta in Transition*, 163.

[100] Collinson, in Reading (ed.), *Sedimentary Environments*, 53.

[101] Collinson, in Reading (ed.), *Sedimentary Environments*, 50. The Nile branches are meandering (i.e. move their position) and so may act in this manner, with the meander cutting into levees on the outside of the bend and depositing fine sand as a point-bar deposit on the inside. The sediments accrete upon the point bar in an inclined gradient.

[102] Collinson, in Reading (ed.), *Sedimentary Environments*, 49 and fig. 3.17.

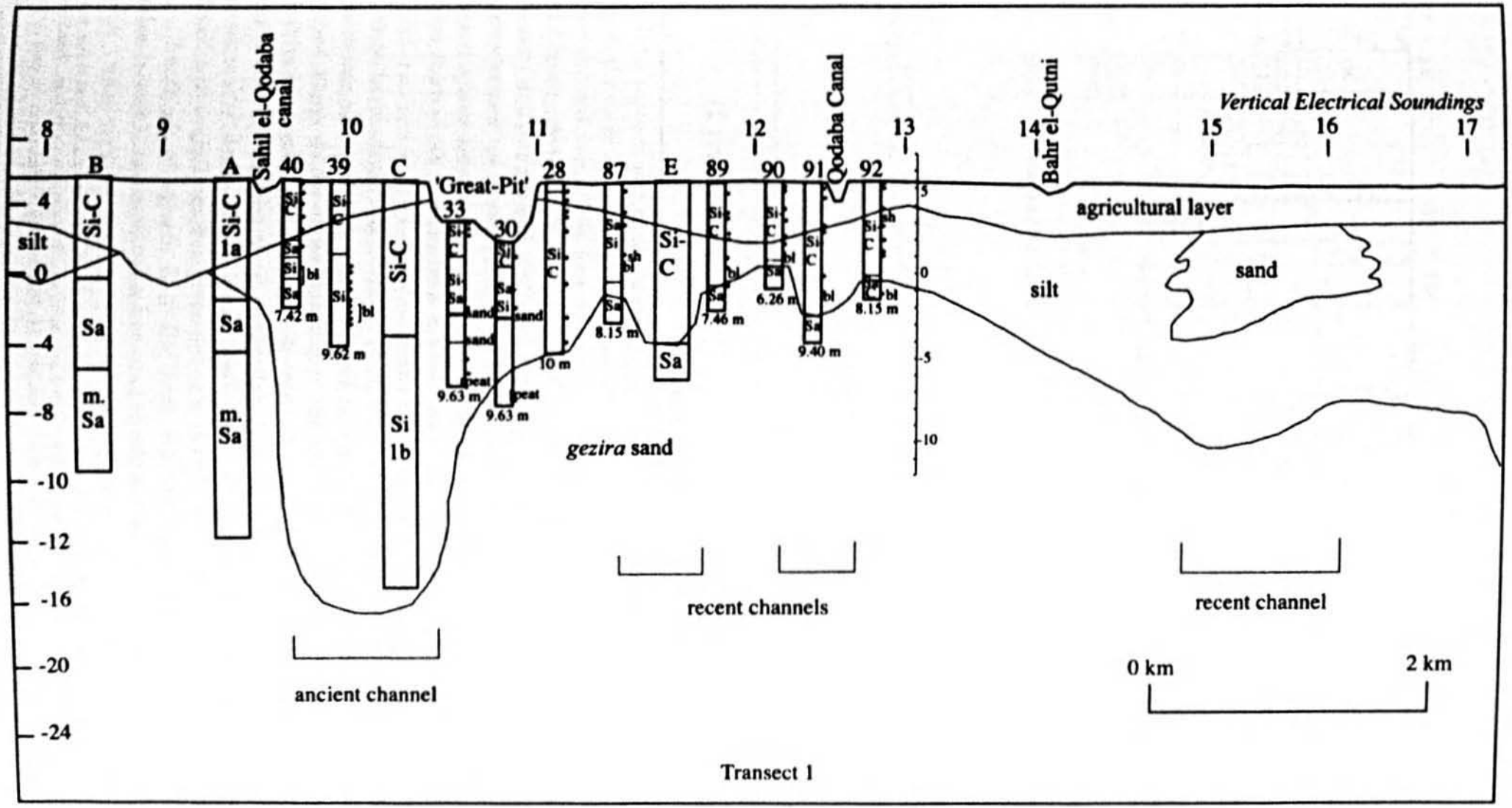



FIG. 16. Reconstruction of palaeotopography from Transect 1.

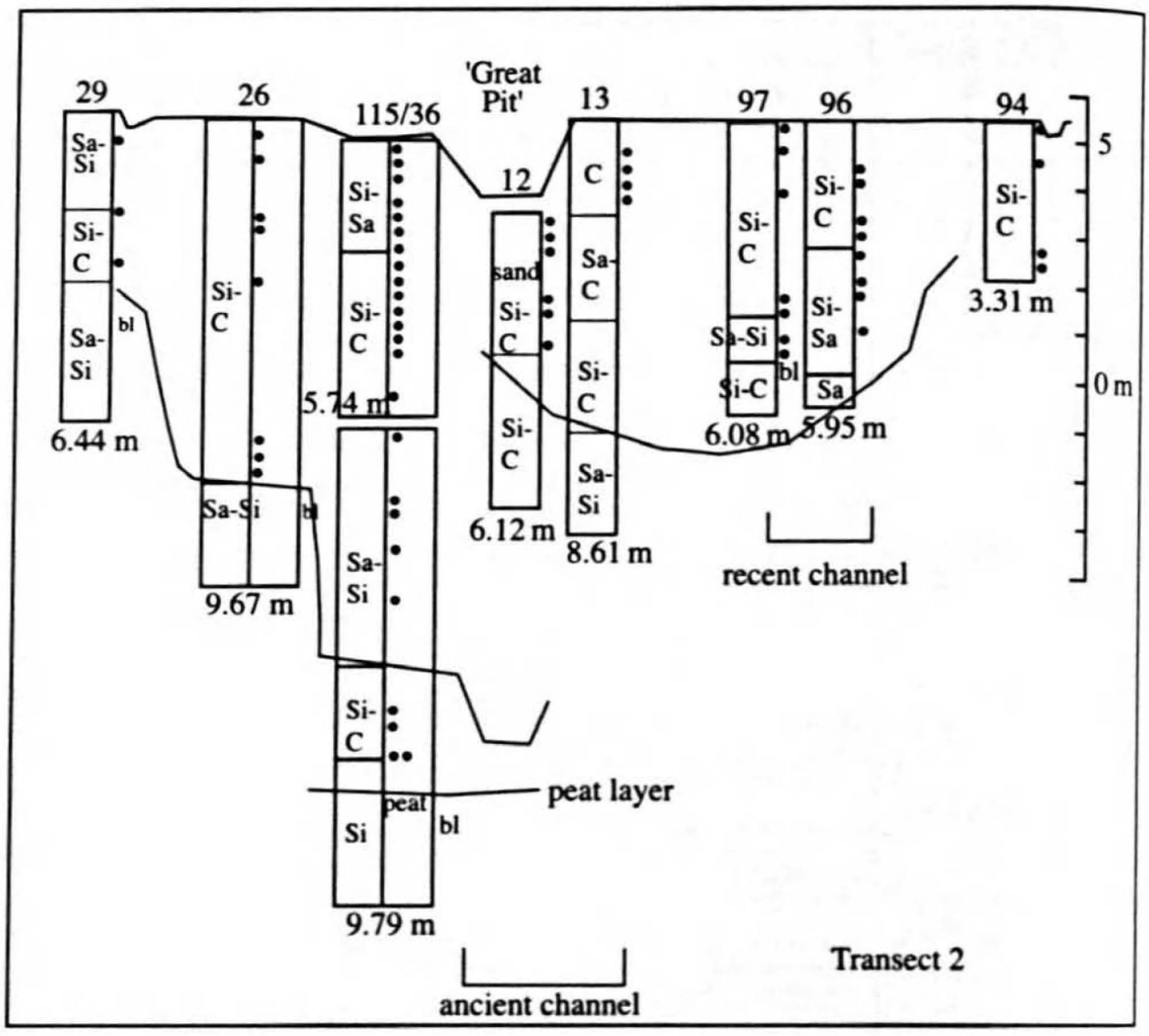



FIG. 17. Reconstruction of palaeotopography from Transect 2.

environments such as those described above. In the Fayum[103] catfish were caught in late spring to early summer when the inundation waters were low, leaving the fish stranded in shallow pools, and between the summer to autumn, when the inundation waters were high and the fish were spawning. At both times they could have been most easily caught by spearing, netting or by hand. By contrast, *Synodontis* is a deep water fish which could be captured in the river from boats by spearing or netting.

During the Late Neolithic Period, the floodplain near Sa el-Hagar could have been exploited further to the east for the cultivation of emmer wheat and flax. The marshier area would have supported an abundance of grasses, weeds and reeds which could have been managed as pastureland for pigs and cattle. Perhaps due to a spell of increased aridity this specific location was abandoned, leaving it to be deflated in dry conditions. If habitation was still possible in the floodplain around Sais, it may have moved to the south, where there was a large sand hill at Qodaba and Basyun (fig.13) or to the north at Kom Rebwa (the Northern Enclosure, fig. 2) where there was a further sand hill.[104] A change in the flood regime, probably during the fourth millennium, seems to have had a double effect. Alluvial sediment

[103] D. Brewer, 'A Model for Resource Exploitation in the Prehistoric Fayum', in Krzyżaniak and Kobusiewicz (eds), *Late Prehistory of the Nile Basin*, 127–37.

[104] Some Prehistoric pottery has been collected from drill augers in the Kom Rebwa area, but it has not been dated precisely; see, for example, in Wilson, *The Survey of Sais*, core 73, 185; core 63, 187.

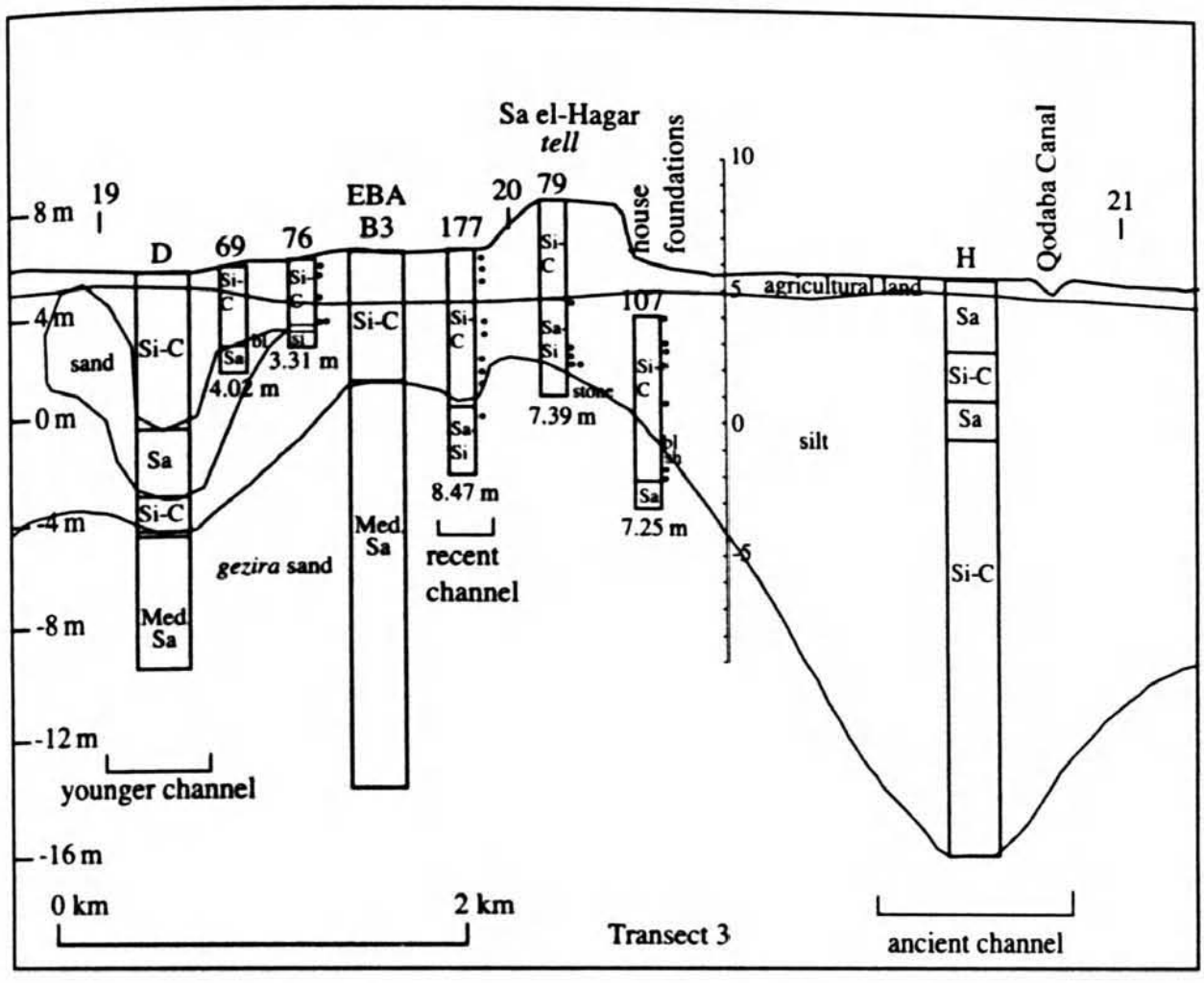



FIG. 18. Reconstruction of palaeotopography from Transect 3.

covered the eastern side of the sand-bar, perhaps due to increased floodwater either caused by higher floods or coming through a second channel to the east which doubled the amount of water and sediment. The new channel and intensive flooding meant that the area was not suitable for sustained settlement, particularly during the inundation. This process may have continued for over 300 years.

Later, the land on the western side of the 'Great Pit' was exposed and again provided an adequate high area for the resettlement of the Buto-Maadi culture people. They may have moved a short distance within the immediate area or have come in from much further afield. The drill transects also record some dense later layers of human settlement, particularly on the eastern side of the Sa el-Hagar area, between the 'Great Pit' and the Qodaba Canal. There was also a water channel in more recent times to the east of the Qodaba Canal, now no longer extant, perhaps representing an older natural channel of the controlled irrigation canal which was amalgamated into the nineteenth century perennial irrigation system of Northern Egypt.[105] The Saite and Ptolemaic Period layers to the west of the 'Great Pit' and underneath the houses of the extended western section of the village seem to have been founded directly upon the Predynastic material. If there were a continuous development of the site from that period, the likelihood is that most of the material has been removed during the Twenty-sixth Dynasty restructuring work and was integrated into later building projects. Other areas of the site, such as Kom Rebwa inside the Northern Enclosure, may

[105] For map of nineteenth century perennial irrigation system, see W. Willcocks, *The Nile in 1904* (London, 1904), pl. xix.

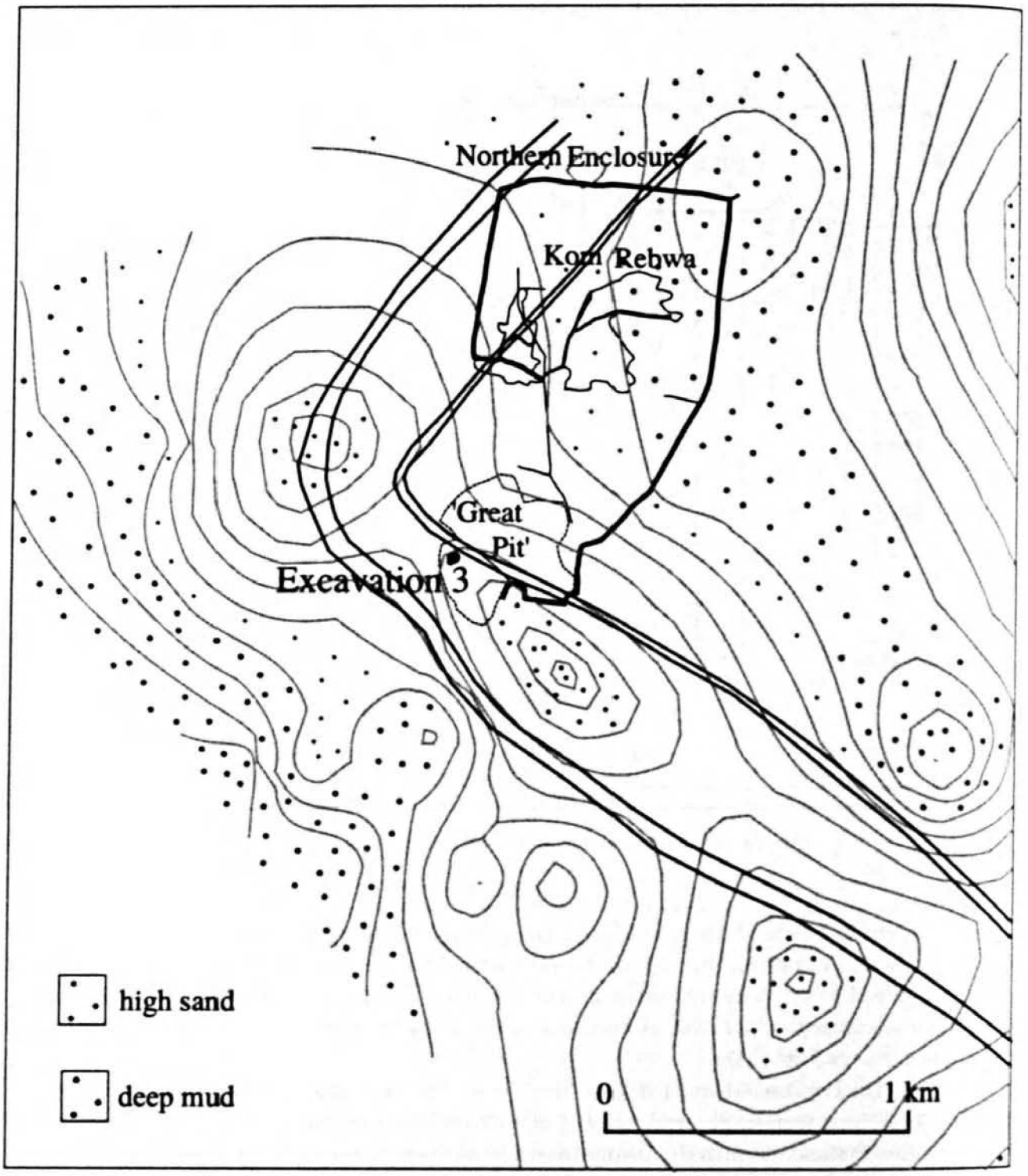



FIG. 19. Reconstruction of ancient river courses, high sand and mud channels relative to archaeological zones at Sa el-Hagar (after El-Shahat et al., *Journal of Geology and Geophysics, Mansoura University* 32/1, fig. 4).

represent the Old Kingdom and later city.[106] Kom Rebwa is therefore more likely to preserve a long stratigraphic sequence than the 'Great Pit', which only has strata of destroyed Saite Period material and a settlement area of Neolithic through to Buto-Maadi Period date. The extent of the Prehistoric zone was from the south, underneath the modern village of Sa el-Hagar to the north-west side of the 'Great Pit', and has been revealed fortuitously by the excavation of soil from the 'Pit' for use in land reclamation or dyke building in the late nineteenth and early twentieth centuries.[107]

[106] Excavations in Kom Rebwa have found evidence for Old Kingdom and New Kingdom material (Wilson, *JEA* 87, 2–4; *JEA* 88, 3–6; 'Sais (Sa el-Hagar), 2003–04', *JEA* 90 (2004), 2–6) and drill cores to the south of Sa el-Hagar contained Old Kingdom pottery sherds (Wilson, *JEA* 90, 8).

[107] Wilson, *The Survey of Sais*, 147–8.

## The regional context of the Sais Prehistoric material

Deeper drill cores undertaken over a wider area during the work at Sais and also the earlier work carried out by the German Mission at Buto to some extent help to place the archaeological evidence from this part of the western Delta into a regional context. A wider understanding of the impact of the environmental profile upon human activity in the Prehistoric Period in the central and western Delta may provide a different perspective for understanding the existence of towns or even of a Lower Egyptian kingdom. In the Buto-Maadi Period (*c.* 3,500 BC) the river channels and its distributaries fed into the Burullus lake or marsh zone with a main branch mouth not too far from Buto itself. Buto may have owed its existence in the Buto-Maadi Period and its rise to power in the Early Dynastic Period to its function as a port, providing a base for the navigation of the northern marshes and thence contacts with the sea routes of the Eastern Mediterranean.[108] Buto was, like Sais, a multi-centred site because of the number of river and distributary channels and the variable floodplain nearby, but the two places do not seem to have shared exactly the same environments. Drill augers at Buto by Wunderlich and Andres and along the northern Delta fringe by the Smithsonian Institute have demonstrated that the northern fringe (that is, the area below the modern 1 m above sea level contour line) was lagoonal and marshy in the Holocene and that this gave rise to a considerable layer of peat which was found in the Buto drill cores and dated to the beginning of the fifth millennium.[109] Although it is possible that the peat layer at Sais may be related to this phenomenon and thus provide a useful date for some of the geological evidence, there may instead be a local cause, such as an oxbow-lake formed in a blocked river bend, or a basin left by the earlier river channel and filled with water which did not fully escape over the course of the year.

The deep drills at Sais have also shown that there was a channel to the east of Sais, which was most likely to have been a branch of the river which existed in one form or another into the historic period and flowed northward to Buto.[110] The channel had no means of pushing further to the west in Prehistoric times because of the existence of a massive sand ridge. Butzer mapped this ridge in the central Delta plain,[111] but it appears that its tail extends further north and lies under the area to the east of Basyun and Shubra Tana (fig. 20). If this ridge was at one time a significant feature in the landscape, it may have served to divide the Delta into eastern and western parts, with consequences for human communication, movement and cultural influence in the Prehistoric Period. Models of settlement prediction established after the eastern Delta survey[112] suggest that the central sand hill should have been a prime area for human habitation and that drill augering could show the presence of settlements in the area. In some places the sand may be relatively near enough to the surface that trial trenching, local development projects or fieldwalking may reveal early sites. Further work may begin to redress the balance between the east/west divide in numbers of sites and also begin to demonstrate that Buto was part of a network of Lower Egyptian settlements throughout the Delta. While the presence of the Neolithic deposits at Sais and their excavation is partly due to chance because of the nature of the site, they do show that traces can be found of the existence of Delta floodplain culture. If further sites can be

[108] Wilkinson, *Early Dynastic Egypt*, 342; R. J. Wenke and D. J. Brewer, 'The Archaic–Old Kingdom Delta: the Evidence from Mendes and Kom El-Hisn', in M. Bietak (ed.), *House and Palace in Ancient Egypt* (Österreichische Akademie der Wissenschaften Denkschriften der Gesamtakademie 14; Vienna, 1996), 270; and von der Way (*Untersuchungen*, 65) suggests that Buto may have functioned as the port of trade for Sais in the Early Dynastic Period.

[109] W. Andres and J. Wunderlich, 'Untersuchungen zur Palaeogeographie des Westlichen Nildeltas im Holczan', *Marburger Geographische Schriften* 100 (1986), 126; calibrated dates in Andres and Wunderlich, in van den Brink (ed.), *The Nile Delta in Transition*, 161 fig. 4 and 163.

[110] Former river distributaries were also identified at Buto, of which one may have been the northern extent of the 'Saitic' branch: Wunderlich, in van den Brink (ed.), *The Archaeology of the Nile Delta*, 252 and 253 fig. 2.

[111] K. Butzer, *Early Hydraulic Civilization in Egypt* (Chicago, 1976), 24 fig. 4 and id. 'Delta', *LÄ* I, 1047–8.

[112] Van den Brink, in Krzyżaniak, Kobusiewicz and Alexander (eds), *Environmental Change*, 279–304.

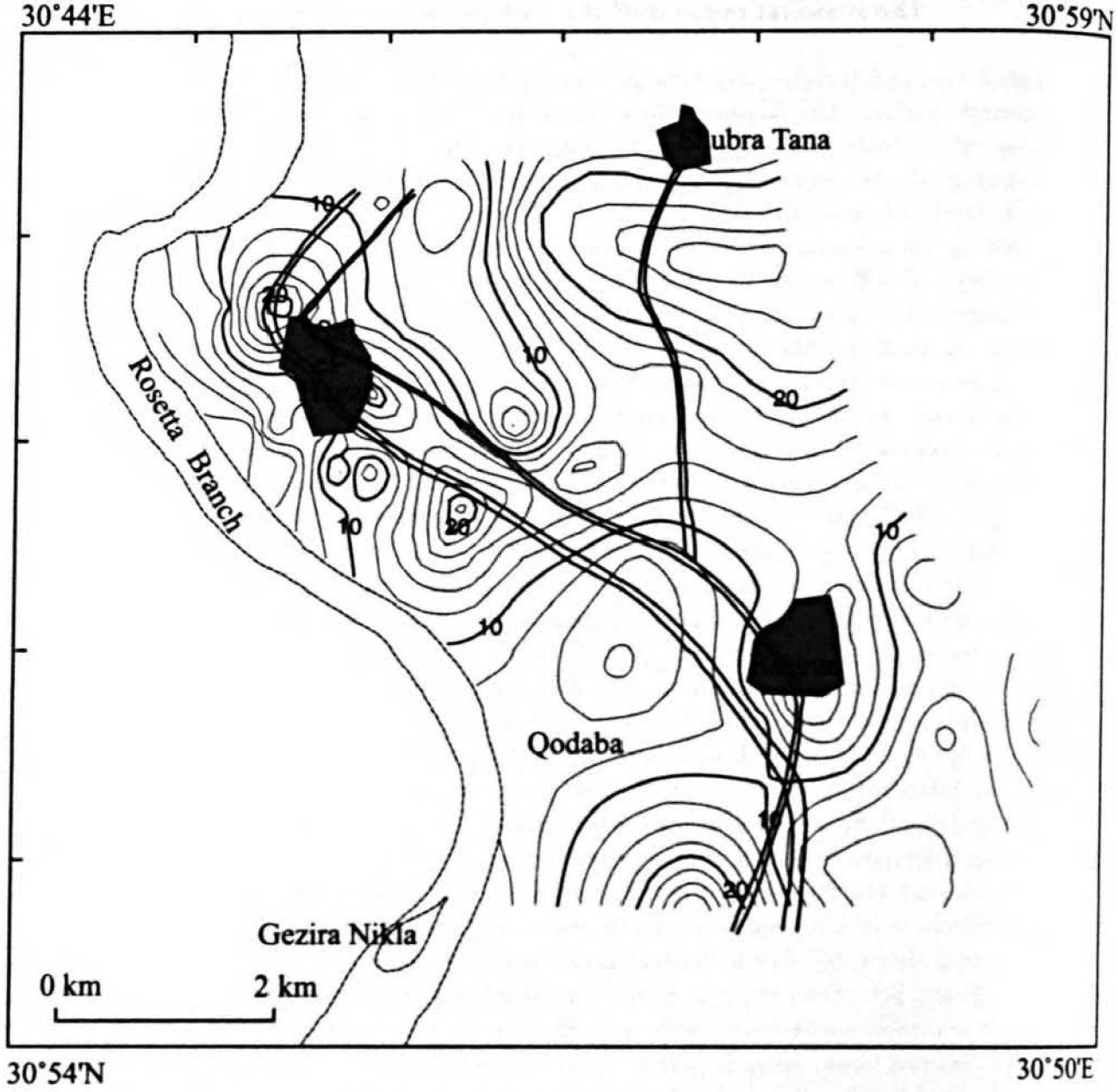



FIG. 20. Isopach contour map of Holocene mud and sand, with reconstruction of younger and older river channels, Sa el-Hagar area (after Lotfi Belal, *Sedimentological and Geophysical Studies*, 103, fig. 6.13).

identified on the west and in the centre of the Delta in future surveying projects, then excavated material from them could be used to begin to tackle the cultural questions still outstanding for the Prehistoric Period and help to clarify the nature of the development of Lower Egyptian culture from the Neolithic to the Chacolithic Period.

## Conclusions

The analysis of the Prehistoric material from Excavation 3 at Sais and research into its geoarchaeological context at a local and regional scale suggest that climatic conditions had profound effects on settlement sites located on the western Delta floodplain. Periods of aridity followed by increased flooding at the end of the Neolithic Period as detected at Sais may not be visible in the Merimde environmental and stratigraphic record, as this area was high above the floodplain and would not have been affected physically by the change in flood patterns. It may, however, be visible in the archaeological record, particularly if the people living in Merimde were connected with or were the same people as those who settled on even a seasonal basis at sites like Sais. There should be evidence for either an increase in activity

between the Neolithic and Late Predynastic Period as people were forced to stay at the desert edge, or a decrease as people found it altogether impossible to live there. In the Fayum, increased aridity around 4,000 BC seems to have led the hunter-gatherers who had foraged there to abandon the area, presumably because there was not sufficient savanna to support the wild animals they hunted or grasses they harvested.[113] As a result they may have adopted a more sedentary lifestyle and taken advantage of the conditions in the Nile valley. With increased rainfall it may have been possible for people to cultivate the wadi sides at Merimde, as well as the edges of the floodplain using basin irrigation. In this way their movement between desert and floodplain could have ceased for several generations, thus creating the gap in the archaeological record at Sais. By the time the flood and climate systems had stabilised, the Lower Egyptian peoples had developed a Chacolithic Predynastic culture that owed more to southern Upper Egyptian or north-eastern Palestinian connections. Perhaps the value of the luxury resources of those areas outweighed the basic fish and grain surpluses of the north. The volume of western trading links may not have been as attractive as those to the east had become. The impetus for trade contacts between the cultures of Upper Egypt and the Levant and the period of aridity and high flooding in the north may have coincided, making it difficult to discern whether Southern Egyptian culture became dominant because of environmental conditions or socio-economic developments.[114] The culture influence shift may have provided the beginning of the economic diffusion of Upper Egypt northward and meant that the potential of the Neolithic culture base of the Delta was never realised. The variability of the floods and the vulnerability of some settlements on the northern floodplain made it difficult to manage trading links until the foundation of Buto, Sais and perhaps other settlements on the western river branches, perhaps by the Maadians. Some areas, which had previously been used as temporary fishing sites by western Delta fringe people and had been abandoned, now provided more permanent settlement spaces, linked by riverine systems into a larger trading and provisioning network. The mobile individual communities would have been replaced by a larger system of organisation managing the floodplain and marshes more efficiently. The relatively small groups of hunter-gatherers who may have initially traded and interacted with the 'new' farmers may soon have found that the farming communities were expanding both in terms of territory and population and trading in commodities from much further afield than the desert edge.

As the material at Sais is, at present, not too deeply buried and is relatively accessible, further work in the 'Great Pit' and in the area around the site may throw light on three key periods of transition in Egyptian Prehistoric culture: the arrival and nature of the Neolithic communities in the western Delta; the introduction of domestication in agriculture and animals; and the hiatus which seems to exist between the end of the Neolithic and the beginning of the Buto-Maadi phase. The analysis of the larger amount of material recovered from Excavation 8 will show the potential of Sais to answer some of these questions at a micro-level. Further excavation will be necessary at the site in order to obtain a greater statistical sample, particularly of faunal and floral data which is not preserved so well, in order to assess the wider issues concerning its connections with the Near East.

[113] R. J. Wenke and D. J. Brewer, 'The Neolithic–Predynastic Transition in the Fayum Depression', in Friedman and Adams (eds), *The Followers of Horus*, 175–84.

[114] Butzer (in van den Brink (ed.), *The Nile Delta in Transition*, 95–6) has cautioned against reading too much into geoarchaeological coincidences and neat generalisations, but suggests that individual places should be considered in the light of multiple factors including time, ecology, social and economic issues.

## Appendix: Pottery and object catalogue

The catalogue contains the main pottery types, decorated sherds and objects from Excavation 3, the 'Great Pit'. It is intended as a preliminary list of the pottery corpus from Sais and an aid to dating the Prehistoric phases of the excavation. The material is kept in the Supreme Council for Antiquities office store at Sa el-Hagar. The catalogue is arranged chronologically by context as set out on p. 88ff. The labelling of each context's material begins at 1 and so is referred to in the main text by both context and number. Most of the material in the catalogue is pottery, but for some contexts there are one or two objects. The lithics (flint and chert fragments) are dealt with separately at the end, so that they can be compared easily, unmixed with the pottery. They have separate lithic numbers (thus [3008] L.58) and only the most diagnostic are included. Most of the other fragments are chips and debitage from flint working.

The pottery is described as: type of sherd, pottery type according to the Friedman and Adams classification system (Adams, *Excavations in the Locality 6*, 7–17), ware type specifying inclusions and with ware type according to the pottery analysis (tables 1–3), estimated diameter of the vessel, colour description with the nearest colour from the Munsell soil colour charts and colour of the sherd break for an indication of firing temperature. Comparanda are cited when the pottery type is particularly distinctive—for example, bowls change relatively little over time, so are not as useful for comparison as decorated body sherds or necked jars and pointed bases.

### *[3002]* (fig. 21)

*Pottery*

1. Bowl rim (1b1), straw-tempered Nile silt, with limestone (ware 1). Diameter: *c.* 20 cm. Colour: reddish-yellow (5YR 6/6 to 6/8). Break: light brown/pink/light brown.

2. Large bowl or tray rim (1f), untempered Nile silt, very soft surface (ware 2). Diameter: *c.* 40 cm. Colour: (o) light brown 7.5YR 6/4, (i) red 2.5YR 5/6. Break: brown/pink/brown.

3. Bowl rim, slight external lip (1g), straw-tempered Nile silt (ware 1). Diameter: *c.* 25 cm. Colour: pale brown (10YR 7/4). Break: light brown/red brown/light brown.

4. Bowl rim, everted (1g), straw-tempered Nile silt (ware 1). Diameter: *c.* 24 cm. Colour: (o) light brown (7.5YR 6/4), (i) red-brown to brown (7.5YR 6/6 to 5/2). Break: brown/orange/brown at body, brown/black/brown at rim.

5. Bowl rim, everted (1j2), straw-tempered Nile silt (ware 1), with limestone. Diameter: *c.* 16 cm. Colour: light yellow-brown (10YR 6/4). Break: brown/red-brown/brown.

6. Bowl rim, everted (1j2), straw-tempered Nile silt (ware 1), with limestone. Diameter: *c.* 24 cm. Possible traces of red slip on upper part of rim and below ledge. Colour: light yellow-brown (10YR 6/4). Break: brown/red-brown/brown.

7. Large tray rim (1n), coarse straw-tempered Nile silt (ware 3). Diameter: *c.* 40 cm. Colour: (o) pale brown (10YR 7/3), (i) light red (2.5YR 7/6). Break: brown/orange/black/orange/brown.

8. Closed jar rim (2c), straw-tempered Nile silt (ware 1). Diameter: *c.* 20 cm. Colour: (o) light brown (7.5YR 7/4), (i) reddish-brown (7.5YR 6/6). Break: brown/pink/brown.

9. Closed vessel rim (2d?), straw-tempered Nile silt (ware 1). Diameter: *c.* 7 cm. Colour: (o) light brown (7.5YR 6/4), (i) reddish-yellow (5YR 6/6). Break: brown/orange/brown.

10. Closed vessel rim (2d), straw-tempered Nile silt (ware 1). Diameter: *c.* 5 cm. Colour: light brown (7.5YR 6/4). Break: light brown/dark brown/light brown.

11. Closed jar rim (2d), straw-tempered Nile silt (ware 1). Diameter: 5.5 cm. Colour: reddish-yellow (5YR 7/6). Break: brown/red/purple/red/brown.

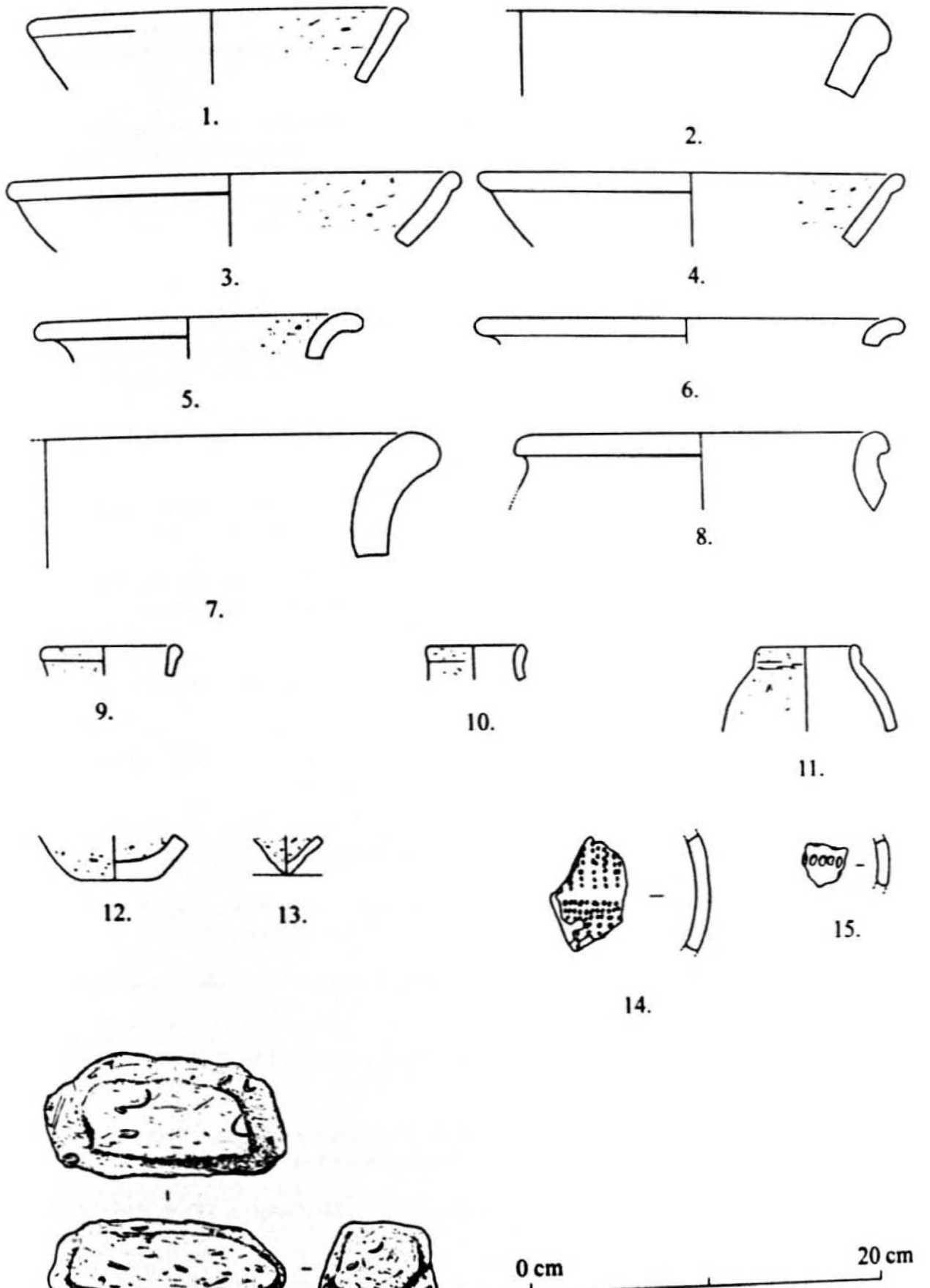



FIG. 21. [3002] pottery and object.

12. Flat base (F2), untempered Nile silt (ware 2), with a few bits of limestone. Colour: grey (10YR 5/1). Break: black/brown/red/black.

13. Pointed base (P1a), straw-tempered Nile silt (ware 1). Colour: light brown (7.5YR 6/4). Break: light brown/red/light brown.

14. Sherd with impressed dot-design of chevrons and horizontal bands. Straw-tempered Nile silt (ware 1). Colour: (o) grey (10YR 5/1), (i) brown (10YR 5/3). Break: black/brown/grey/brown.

15. Sherd with impressed design of dots in horizontal bands. Untempered Nile silt (ware 2). Colour: light brown (7.5YR 6/4). Break: orange-brown throughout.
Cf. von der Way, *Buto* I, Taf. 39, 19–22 (Level II and IIa).

*Object*
16. Brick. Coarse straw- and limestone-tempered, Nile silt ware, with voids up to 4 mm in the fabric. Length: 13.7 cm, width: 6.8 cm (maximum dimensions). The ware is medium/soft in hardness and red-orange in colour (7.5YR 6/4 to 6/6 throughout). The object is worn, eroded and salt-damaged.

*[3003]* (figs. 22–3)

*Pottery*
1. Bowl rim (1b), straw-tempered Nile silt (ware 1). Diameter: *c.* 20 cm. Red polish on inside. Colour: red-yellow to grey (5YR 7/6 to 5/1). Break: orange/red/purple/red/brown.

2. Bowl rim (1b), straw-tempered Nile silt (ware 1). Diameter: *c.* 20 cm. Colour: (o) light yellow-brown (10YR 6/4), (i) reddish-yellow (5YR 6/6). Break: brown/red/purple/red/brown.

3. Bowl rim (1b), straw-tempered Nile silt (ware 1). Diameter: *c.* 26 cm. Colour: pink to reddish-yellow (7.5YR 7/4 to 5YR 6/8). Break: brown/orange/purple/black/purple/orange/brown.
Cf. von der Way, *Buto* I, Taf. 21.5.

4. Bowl rim (1b), straw-tempered Nile silt (ware 1). Diameter: *c.* 16 cm. Outside, wet-smoothed. Colour: light yellow-brown (10YR 6/4). Break: light brown throughout.

5. Tray rim (1C), coarse straw-tempered Nile silt (ware 3). Diameter: *c.* 40–50 cm. Colour: (o) light yellow-brown (10YR 6/4), (i) light olive-brown (2.5YR 5/4). Break: brown/black/purple/red.

6. Tray rim, squared (1D), coarse straw-tempered Nile silt (ware 3). Diameter: *c.* 40–50 cm. Colour: (o) reddish-yellow (5YR 6/6), (i) light brown (10YR 6/3). Break: brown/orange/brown.

7. Lipped bowl rim (1g), straw-tempered Nile silt (ware 1). Diameter: *c.* 16 cm. Colour: light red-brown (5YR 6/4). Break: brown/orange/brown.

8. Lipped bowl rim (1g), straw-tempered Nile silt (ware 1). Diameter *c.* 18–20 cm. Colour: pinkish-grey (7.5YR 7/2). Break: pink-grey/red/pink-grey.

9. Lipped bowl rim (1g), straw-tempered Nile silt (ware 1). Diameter: *c.* 18 cm. Colour: light red-brown to light yellow-brown (5YR 6/4 to 10YR 6/4). Break: brown/orange-red/brown.

10. Ledge-rim bowl rim (1j), straw-tempered Nile silt (ware 1). Diameter: *c.* 18 cm. Colour: light yellow-brown (10YR 6/4). Break: brown/red/brown.

11. Closed jar rim (2b), straw-tempered Nile silt (ware 1). Diameter: *c.* 20 cm. Colour: red-brown to yellow-red (5YR 5/3 to 5/6). Break: brown/orange/purple/orange/brown.

12. Closed jar rim (2b), straw-tempered Nile silt (ware 1). Diameter: *c.* 14 cm. Brown polish trace under rim on outside; inside smoothed at rim, otherwise left rough. Colour: (o) brown (7.5YR 5/4) (i) light yellow-brown (10YR 6/4). Break: brown/orange/black/orange/brown.
Cf. von der Way, *Buto* I, Taf. 5.7.

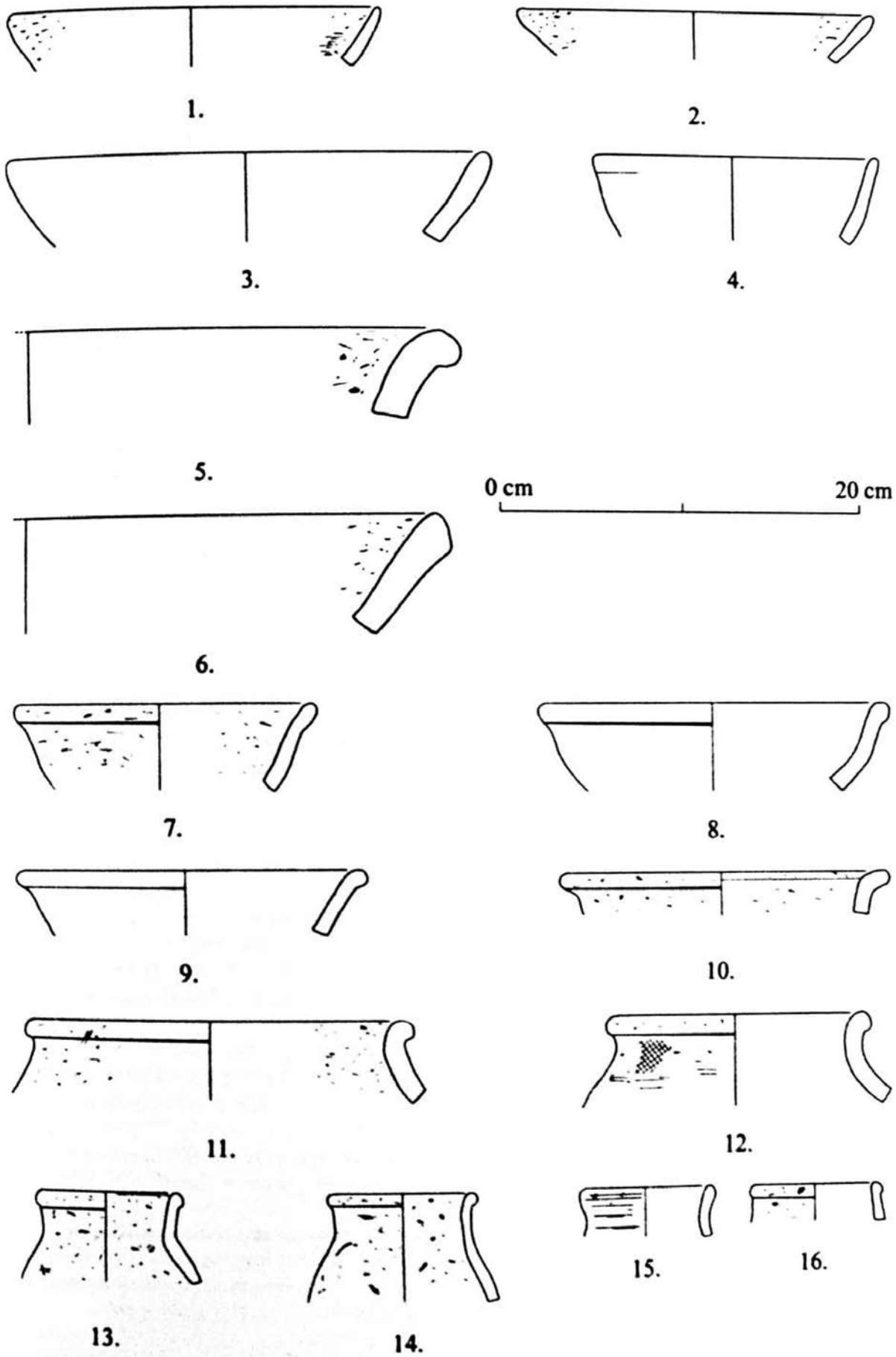
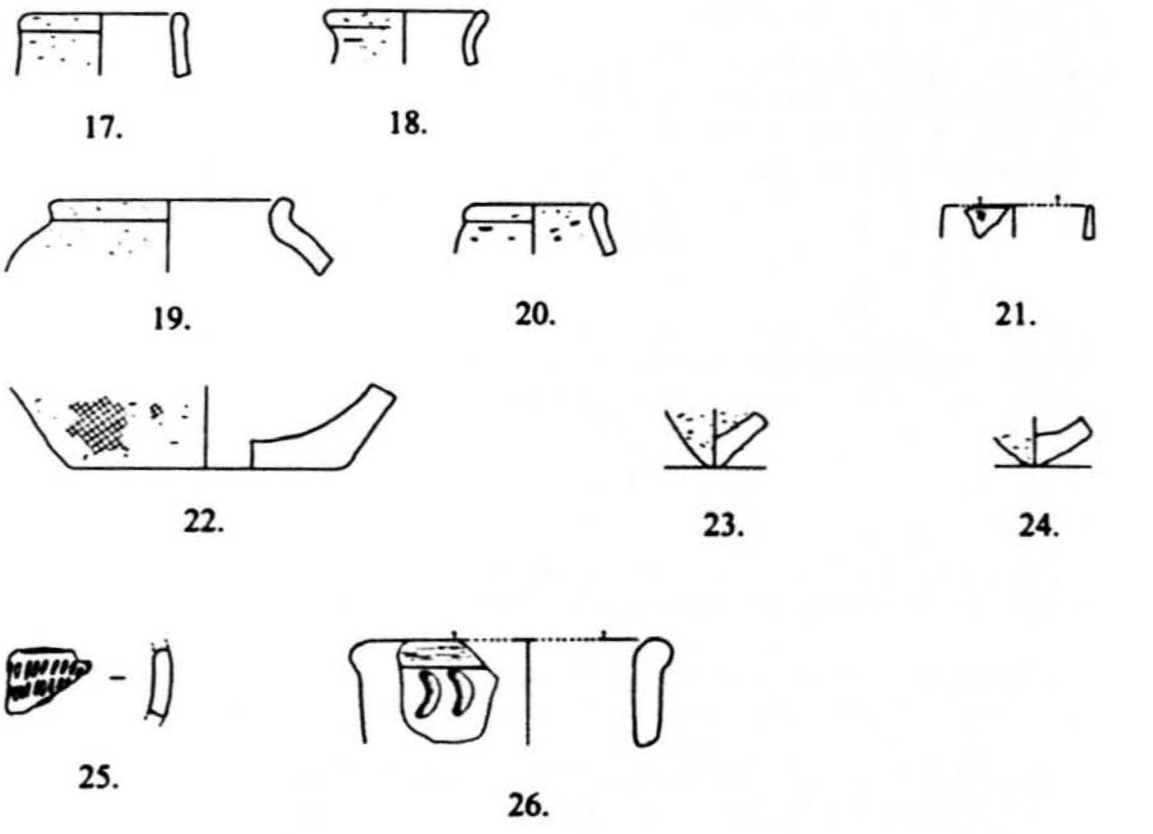
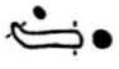



FIG. 22. [3003] pottery.



bull's horn

[3004]

pounder

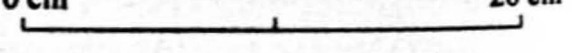



FIG. 23. [3003] pottery and objects, [3004] pounder.

13. Necked jar rim (2c), straw-tempered Nile silt (ware 1), with bits of limestone. Diameter: *c.* 7.3 cm. Colour: light yellow-brown (10YR 6/4). Break: brown/red/black/red/brown.
Cf. von der Way, *Buto* I, Taf. 1.4.

14. Necked jar rim (2c), straw-tempered Nile silt (ware 1), with bits of limestone. Diameter: *c.* 7.2 cm. Colour: (o) light yellow-brown (10YR 6/4), (i) light brown (7.5YR 6/4). Break: brown/red/purple/red/brown.
Cf. von der Way, *Buto* I, Taf. 1.1.

15. Necked jar rim (2c), untempered Nile silt (ware 2), few pieces of straw. Diameter: *c.* 7 cm. Colour: (o) red-brown (5YR 5/3) (i) light yellow-brown (10YR 6/4). Break: orange/purple/orange.
Cf. von der Way, *Buto* I, Taf. 1.5.

16. Necked jar rim (2c), straw-tempered Nile silt (ware 1). Diameter: *c.* 7 cm. Possible traces of red slip on outside. Colour: (o) yellow-brown (10YR 5/6), (i) light yellow-brown (10YR 6/4). Break: brown/red/brown.
Cf. von der Way, *Buto* I, Taf. 1.3.

17. Necked jar rim (2c), straw-tempered Nile silt (ware 1). Diameter: *c.* 6 cm. Colour: red-yellow (5YR 6/8). Break: orange.
Cf. von der Way, *Buto* I, Taf. 1.3.

18. Necked jar rim (2c), straw-tempered Nile silt (ware 1). Diameter: *c.* 6 cm. Colour: red-yellow (5YR 6/8). Break: orange/black/orange.
Cf. von der Way, *Buto* I, Taf. 1.6.

19. Neckless jar rim (2d), straw-tempered Nile silt (ware 1). Diameter: *c.* 9 cm. Colour: red-yellow (5YR 6/6). Break: brown/orange/purple/orange/brown.
Cf. von der Way, *Buto* I, Taf. 5.2.

20. Neckless jar rim (2d), straw-tempered Nile silt (ware 1). Diameter: 6.2 cm. Colour: red-yellow (5YR 6/8). Break: orange/purple/orange.

21. Fine black-topped rim (closed jar?), untempered Nile silt (ware 2). Diameter: unknown. Black polished at rim, red polish lower on body. Colour: black (10YR 3/1). Break: brown throughout. Upper Egyptian import.

22. Flat base (F2), straw-tempered Nile silt (ware 1). Diameter: *c.* 12 cm. Traces of brown polish on outside. Colour: (o) light brown (7.5YR 5/4), (i) light yellow-brown (10YR 6/4). Break: brown/red/purple/black/purple/red/brown.
Cf. von der Way, *Buto* I, Taf. 34.4–5.

23. Pointed base (P2), straw-tempered Nile silt (ware 1). Colour: (o) light brown (7.5YR 6/4), (i) light red (2.5YR 6/6). Break: orange/purple/orange.
Cf. von der Way, *Buto* I, Taf. 1.1.

24. Pointed base (P2), straw-tempered Nile silt (ware 1). Colour: (o) red-yellow (5YR 6/8), (i) light red (2.5YR 6/6). Break: orange/pink.

25. Sherd with impressed (fingernail?) design in two horizontal bands. Straw-tempered Nile silt (ware 1). Colour: (o) black to pale brown (10YR 2/1 to 6/3), (i) pale yellow-brown (2.5YR 6/3). Break: black/brown/red/purple/orange.
Cf. von der Way, *Buto* I, Taf. 39, 19–22 (Level II and IIa).

26. Rim of large bowl or tray, with impressed half-moon design in horizontal band just below rim. Untempered Nile silt (ware 2), with few pieces of scattered straw. Colour: (o) brown (7.5YR 4/2 to 5/4), (i) red-yellow (7.5YR 6/6). Break: brown/orange/pink/brown.
Cf. von der Way, *Buto* I, Taf. 29, 2 and 4 (Level II).

*Objects*

27. Model bull-horn. Nile silt, with scattered chaff, red-orange in colour (2.5YR 5/6). Length: 3.1 cm; width: 1.1 cm.

Cf. Eiwanger, *Merimde* III, 127–8, pls. 89–90, especially no. III.168 and cf. IV.958–60 and IV.961–5; Eiwanger, *Merimde* II, 97, pl. 47; nos. II.936–8.

## *[3004]* (fig. 23)

*Pottery*

1. Yellow quartzite pounder/grinder, with flat top and bottom edges and rounded, worn sides. One side was worn straighter from use. Maximum diameter: 6 cm; height 3.8 cm.

## *[3008]* (fig. 24)

*Pottery*

1. Bowl rim (1a), crucible, untempered Nile silt (ware 2). Diameter: *c.* 12 cm. Colour: (o) light brown (7.5YR 6/4), (i) light yellow-brown (2.5YR 6/4). Break: red/brown/light brown.

2. Bowl rim (1b), untempered Nile silt (ware 2). Diameter: *c.* 20 cm. Red polish on inside and probably smoothed polish on outside. Colour: (o) light red-brown (2.5YR 6/4), (i) red-brown (2.5YR 5/4). Break: brown throughout.

3. Bowl rim (1b1), untempered Nile silt (ware 2). Diameter: *c.* 20 cm. Brown polish on inside and smoothed on outside. Colour: (o) pale brown (10YR 6/3), (i) pale-brown to red (10YR 6/3 to 2.5YR 5/6). Break: brown/red/brown/red/purple/brown.

4. Large bowl rim (1b3), untempered Nile silt (ware 2). Diameter: *c.* 30 cm. Brown and black polish on inside and outside. Colour: (o) blackened. Break: dark brown/brown/medium brown.

5. Bowl rim (1b3), untempered Nile silt (ware 2). Diameter: *c.* 20 cm. Probably red polished. Colour: (o) light red-brown (2.5YR 6/4), (i) red-brown (2.5YR 5/4). Break: red throughout.

6. Bowl rim (1b3), untempered Nile silt (ware 2). Diameter: *c.* 20 cm. Brown polish on inside and smoothed on outside. Colour: light yellow-brown to pale yellow (2.5Y 6/2 to 7/3). Break: brown/red-brown/brown.

7. Bowl rim (1b3), untempered Nile silt (ware 2). Diameter: *c.* 24 cm. Brown polish on both sides. Colour: (o) light brown-grey to dark grey (10YR 6/2 to 4/1), (i) light brown-grey (10YR 6/2). Break: brown/black/brown.

8. Bowl rim (1b3), untempered Nile silt (ware 2). Diameter: *c.* 24 cm. Polished on both sides. Colour: (o) red-brown (2.5YR 5/3), (i) red-brown (2.5YR 5/4). Break: light brown/red/brown/red/light brown.

9. Large bowl rim (1b3), untempered Nile silt (ware 2). Diameter: *c.* 30 cm. Polished on both sides. Colour: (o) pink-grey to light brown (7.5YR 6/2 to 6/4), (i) grey to dark grey (10YR 5/1 to 4/1). Break: brown/black. Probably from a black-topped bowl.

10. Bowl rim (1b6), untempered Nile silt (ware 2). Diameter: *c.* 16 cm. Polish (?) on both sides mostly lost. Colour: (o) pale brown (10YR 6/3), (i) dark grey-brown (10YR 4/2). Break: brown throughout.

11. Closed vessel rim (2a1), untempered Nile silt (ware 2). Diameter: *c.* 18 cm. Brown polish on outside, smoothed inside. Colour: light yellow-brown (10YR 6/4). Break: light brown throughout.

12. Closed vessel rim (2a1), untempered Nile silt (ware 2). Diameter: *c.* 20 cm. Brown polish on outside lost, smoothed inside. Colour: light yellow-brown (10YR 6/4). Break: light brown/dark brown/light brown.

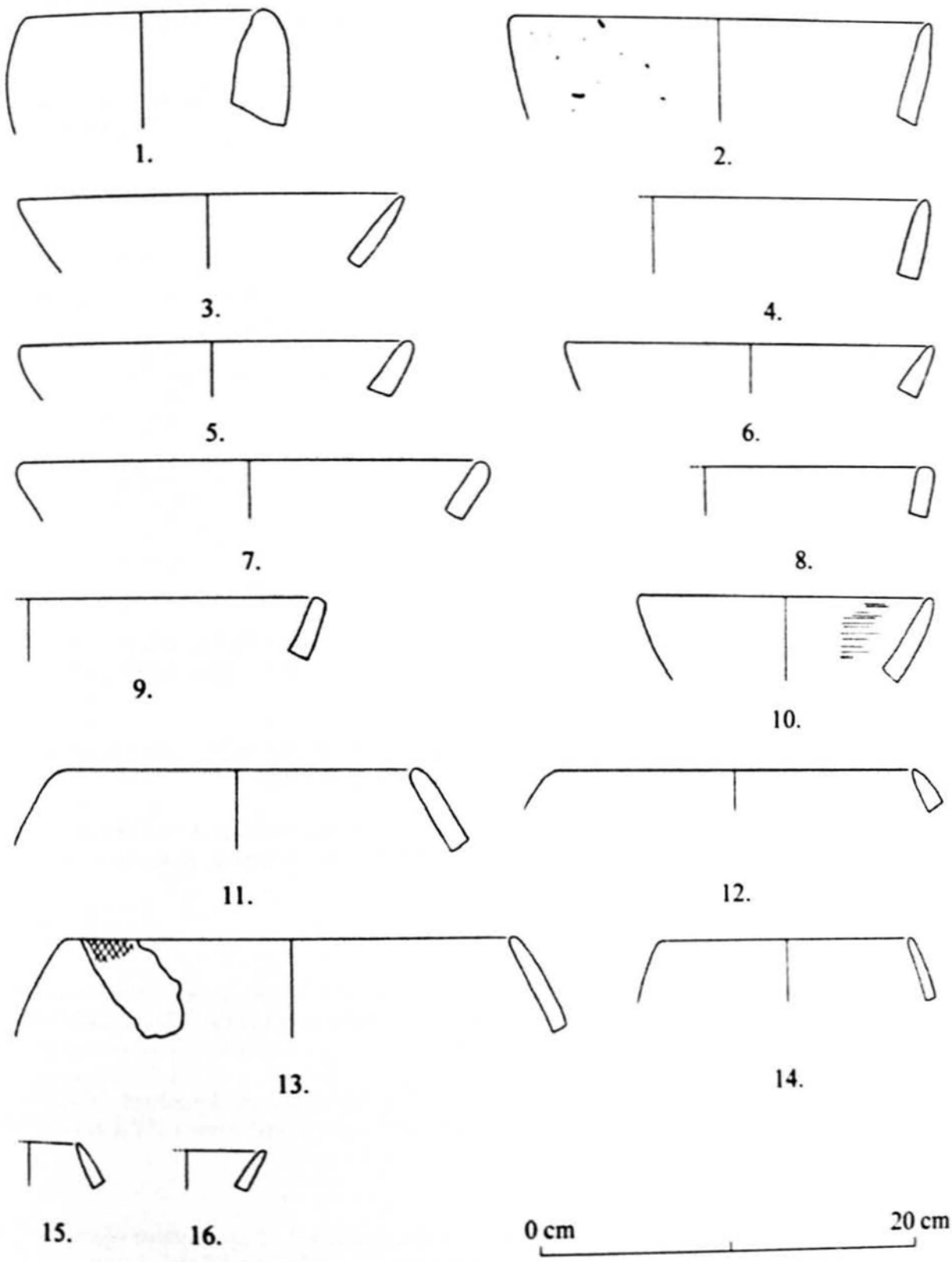



FIG. 24. [3008] pottery.

13. Closed vessel rim (2a1), untempered Nile silt (ware 2). Diameter: *c.* 24 cm. Red polish on outside, inside left unsmoothed. Colour: (o) light olive-brown to dark grey (2.5YR 5/6 to 4/1), (i) pale brown (10YR 7/3). Break: brown/black/red.

14. Incurved rim (2a), untempered Nile silt (ware 2, but perhaps closer to Hierakonpolis ware 22). Diameter: unknown. Red polished outside and inside of rim. Colour: red (2.5YR 4/6). Break: brown throughout.

15. Bowl rim (2a), untempered Nile silt (ware 2, but perhaps closer to Hierakonpolis ware 22). Diameter: unknown. Red polished outside and inside. Colour: (polish) red-brown (2.5YR 4/4). Break: brown throughout.

### *[3015]* (figs. 25–6)

*Pottery*

1. Very large bowl rim (A1), untempered Nile silt (ware 2). Diameter: *c.* 50 cm. Colour: (o) red-yellow (5YR 6/6), (i) light yellow-brown (10YR 6/4). Break: red-brown to brown.

2. Large bowl rim (1b3), untempered Nile silt (ware 2). Diameter: *c.* 35+ cm. Colour: (o) grey-brown (10YR 5/2), (i) pale brown (10YR 6/3). Break: brown throughout.

3. Large bowl rim (1b3), untempered Nile silt (ware 2). Diameter: *c.* 25+ cm. Colour: (o) yellow-brown (10YR 5/6), (i) red (2.5YR 5/8) and grey (10YR 5/1). Break: near rim: brown/red-brown/red; near base: brown/red-brown/red.

4. Bowl rim (1b3), untempered Nile silt (ware 2). Diameter: *c.* 25 cm. Colour: (o) weak red (10R 5/4), (i) light brown (10YR 6/2 to 6/3). Break: near rim: brown/red-brown/brown.

5. Bowl rim (1b3), untempered Nile silt (ware 2). Diameter: *c.* 16 cm. Red polish on outside and inside. Colour: (polish) red (10R 4/6); (polish lost) pale red (10YR 6/4). Break: brown/dark brown/brown.

6. Bowl rim (1b3), untempered Nile silt (ware 2). Diameter: *c.* 26 cm. Smoothed surfaces, polish lost. Colour: grey-brown (10YR 5/2). Break: grey-brown/red-brown/grey-brown.

7. Bowl rim (1b3), untempered Nile silt (ware 2). Diameter: *c.* 25 cm. Smoothed surfaces, polish lost. Colour: (o) yellow-brown (10YR 5/4), (i) light brown (10YR 6/2 to 6/3). Break: near rim: brown/red-brown/brown.

8. Bowl rim (1b3), untempered Nile silt (ware 2), very fine. Diameter: unknown. Salt damaged.

9. Bowl rim, with keel, untempered Nile silt (ware 2). Diameter: *c.* 14 cm. Outside decoration with concentric bands applied by hand and smoothed. Colour: (o) light grey (10YR 7/2), (i) light yellow-brown (10YR 6/4). Break: light brown/black/light brown.

10. Large jar rim, untempered Nile silt (ware 2), few small pieces straw and limestone. Diameter: *c.* 36 cm. Polish on outside mostly lost. Colour: (o) red (2.5YR 5/6), (i) red-brown (5YR 5/3). Break: red/brown/red-brown.

*Object*

11. Red quartzite pounder/grinder, with white band running through it. Two rounded edges and two straight edges, possibly worn from use. Maximum diameter: 6.7 cm; height 2.8 cm.

### *[3016]* (fig. 26)

*Pottery*

1. Bowl rim (1b), untempered Nile silt (ware 2), few scattered straw pieces. Diameter: *c.* 16 cm. Red polished inside. Colour: (o) pale brown (10YR 6/3), (i) light red-brown (5YR 6/4). Break: brown throughout.

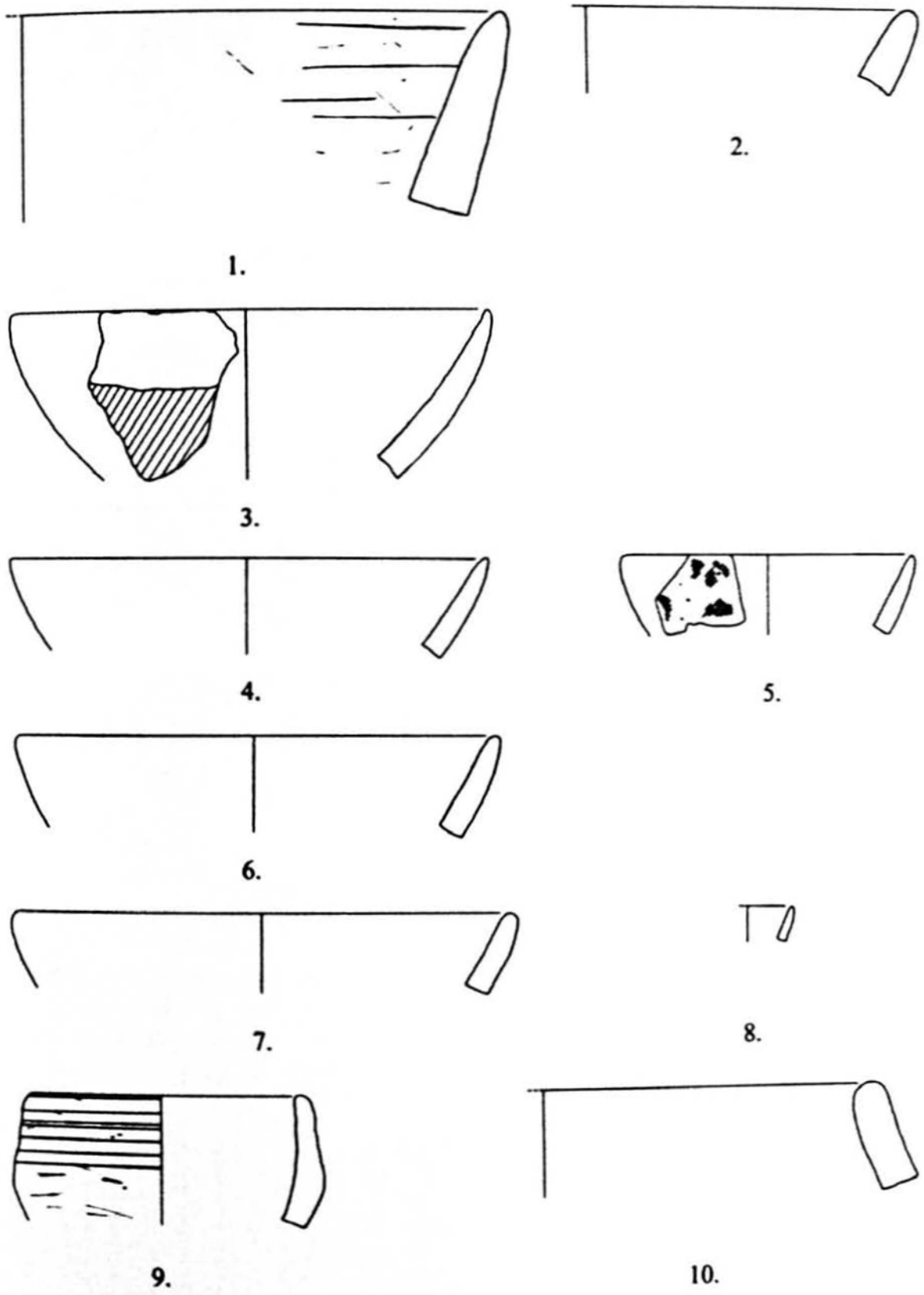
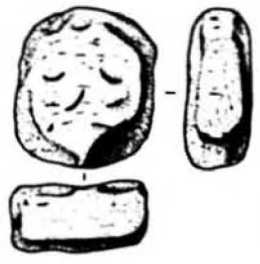



FIG. 25. [3015] pottery.

[3015]



pounder

[3016]

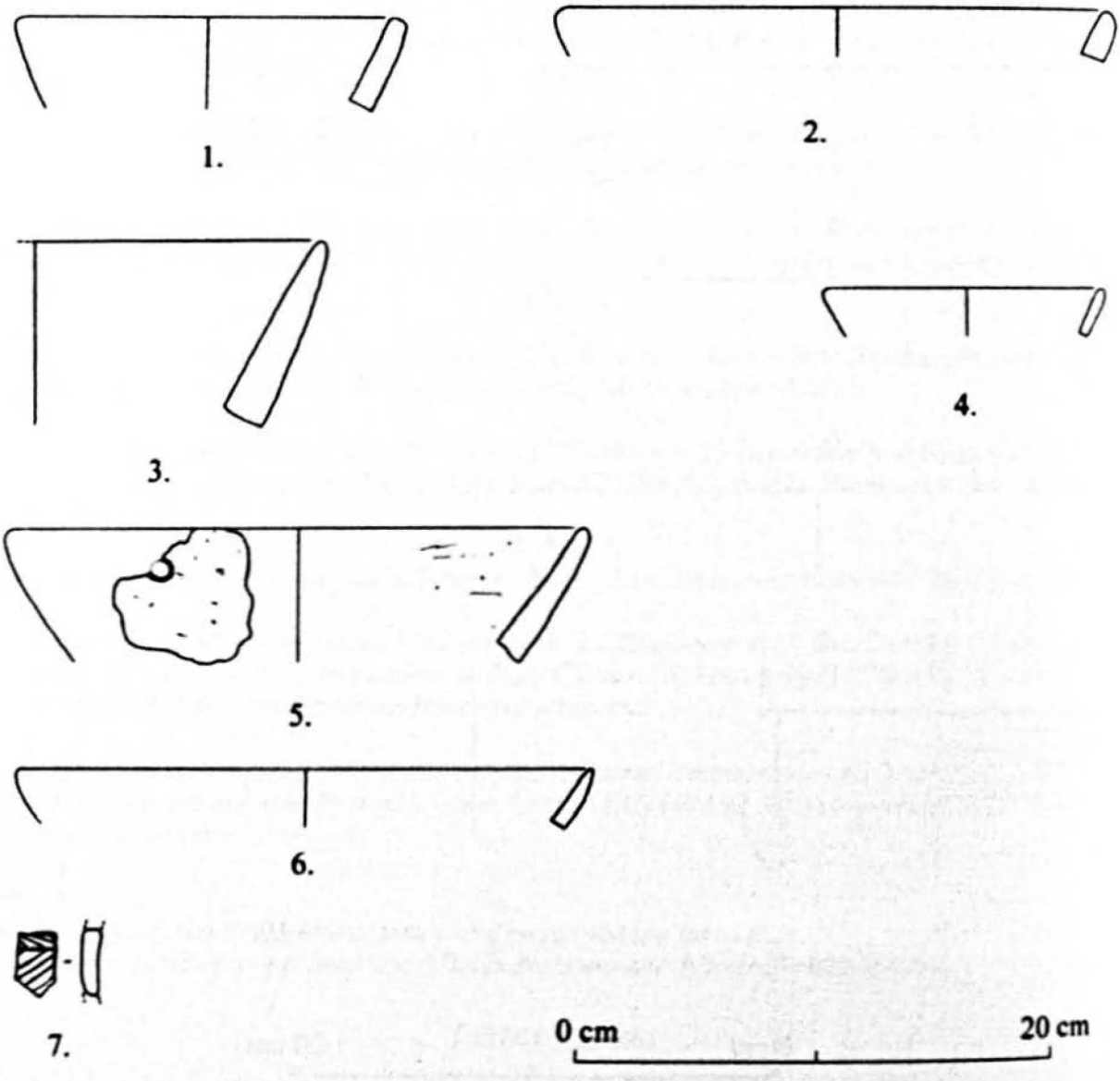



FIG. 26. [3015] pounder, [3016] pottery.

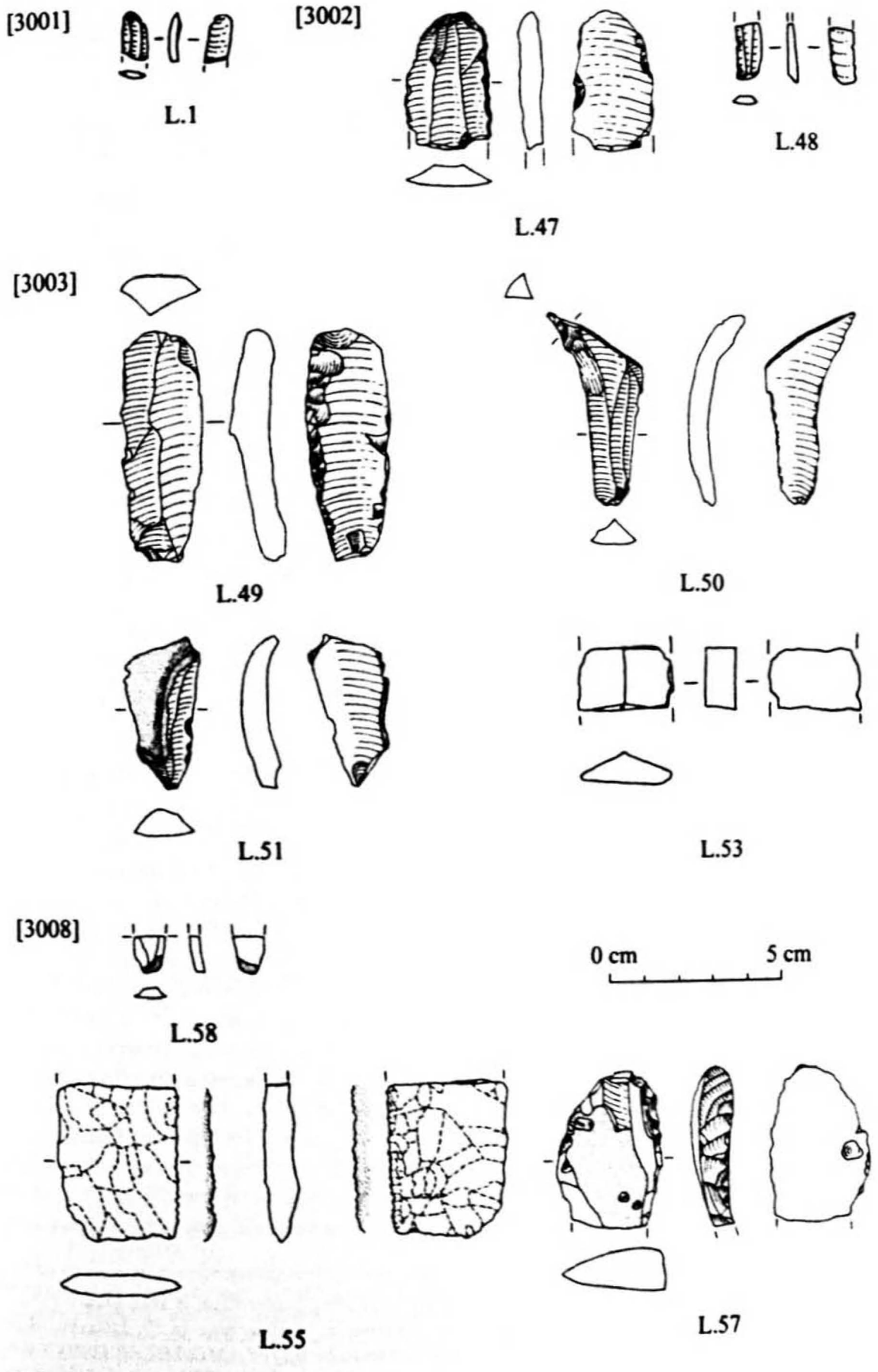



FIG. 27. Lithics from contexts [3001], [3002], [3003] and [3008].

2. Bowl rim (1b), untempered Nile silt (ware 2), a few scattered straw pieces. Diameter: *c.* 24 cm. Smoothed surfaces, polish probably lost. Colour: pale brown (10YR 6/3). Break: brown throughout.

3. Bowl rim (1b1), untempered Nile silt (ware 2), a few scattered straw pieces. Diameter: *c.* 25 cm. Remains of black polish on outside, inside smoothed. Colour: (o) dark grey (10YR 4/1), (i) light brown (10YR 6/3). Break: grey-brown throughout.

4. Bowl rim (1b1), untempered Nile silt (ware 2). Diameter: *c.* 12 cm. Surfaces smoothed, polish probably lost. Colour: (o) red-yellow (5YR 6/6), (i) red-brown (5YR 5/4). Break: brown/black/brown.

5. Bowl rim (1b3), with hole below rim, untempered Nile silt (ware 2), a few scattered straw pieces. Diameter: *c.* 25 cm. Brown polished inside, outside left rough and wiped. Hole drilled after firing (as repair?). Colour: (o) light yellow-brown (10YR 6/4), (i) pale brown (10YR 6/3). Break: brown/grey-brown/brown.

6. Bowl rim (1b3), untempered Nile silt (ware 2). Diameter: *c.* 25 cm. Brown polished inside, smoothed outside. Colour: (o) pale brown (10YR 6/3), (i) brown (7.5YR 4/2). Break: dark brown/brown/dark brown.

7. Sherd from bowl, with incised fish-bone decoration. Untempered Nile silt (ware 2), salt damaged. Colour: (o) red-brown (5YR 5/3), (i) red-brown (5YR 5/4). Break: red-purple throughout.

## *Lithics* (fig. 27)

[3001] L.1 Microblade fragment; dark brown stone; less than 1 g.
Cf. I. Rizkana and J. Seeher, *Maadi*, II. *The Lithic Industries of the Predynastic Settlement* (Mainz, 1988), blades pl. 24.1–5 and 13–15; microblades pl. 33.

[3002] L.47 Blade tool fragment, retouched; brown stone, with black tint at top; 8 g.
The blade fragment was made from an irregular blade and showed signs of wear.
Cf. Rizkana and Seeher, *Maadi* II, blades pl. 25.4–6; T. von der Way, 'Tell el Farain–Buto 1. Bericht', *MDAIK* 42 (1986), Abb. 6.17, Taf. 26–30.

[3002] L.48 Microblade fragment, use wear on both sides; light brown stone, translucent; less than 1 g.
Cf. Rizkana and Seeher, *Maadi* II, blades pl. 24.1–5 and 13–15; microblades pl. 33.

[3003] L.49 Irregular blade tool; red-grey stone with banding; 15 g.
Manufactured from pebble of flint with flaws. Crushed areas on ventral side.
Cf. Rizkana and Seeher, *Maadi* II, pl. 25.1–6.

[3003] L.50 Primary blade tool and also used as a perforator, wear on blade; brown stone, with white cortex; 6g.
Cf. Rizkana and Seeher, *Maadi* II. pl. 23.15.

[3003] L.51 Primary blade tool, use wear on dorsal side; brown stone, with white cortex; 6 g.
Cf. Rizkana and Seeher, *Maadi* II, pl. 23.15.

[3003] L.53 Regular blade fragment; grey stone (burnt); 5 g.
Cf. von der Way, *MDAIK* 45, Abb. 14.7 (Level III).

[3008] L. 55 Fragment of a bifacial sickle blade, possibly burnt or worn; grey to light brown stone.
Cf. Rizkana and Seeher, *Maadi* II, pl. 73.1–8.

[3008] L.57 End scraper with retouch on flake; black and grey, burnt flint, cortex grey.
Cf. Rizkana and Seeher, *Maadi* II, pls. 37 and 38.8; discussion of this type in T. Hikade, 'Some Thoughts on Chalcolithic and Early Bronze Age Flint Scrapers in Egypt', *MDAIK* 60 (2004), 5–68.

[3008] L.58 Microblade fragment; brown flint, white cortex with red veins.